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WILDLIFE IN NORTH CAROLINA

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BIENNIAL REPORT
JULY 1, 1986-JUNE 30, 1988

North Carolina Wildlife Resources Commission

512 N. Salisbury Street, Raleigh, North Carolina 27611, 919-733-3391
Charles R. Fullwood, Executive Director

His Excellency, The Governor Of North Carolina
Members of the General Assembly
Raleigh, North Carolina

Dear Sirs:

I am pleased to present to you the 21st Biennial Report of the North Carolina Wildlife Resources Commission. This report reflects the Commission's activities and accomplishments for the period beginning July 1, 1986, and ending June 30, 1988.

As chairman of the North Carolina Wildlife Resources Commission, I am happy to report the progress of our continuing stewardship of all wildlife. During this two-year biennium, the Wildlife Endowment Fund principal grew from $5.8 million to $14.9 million, and the interest is providing support for many vital programs, including the acquisition of such valuable wildlife habitat as Conine Island. The 1987 General Assembly established the Wildlife Commission as the agency responsible for nongame and endangered wildlife, and donations through the income tax checkoff have helped fund restoration of the peregrine falcon, bald eagle and other species.

During the biennium, ongoing programs to manage white-tailed deer and wild turkeys recorded impressive advances, and our agency hosted small-game experts from 13 southeastern states to improve populations of small game. Our success in rabbit research at Penny Bend has been particularly encouraging. Vigorous enforcement of wildlife laws has been highlighted by such successful projects as Operation Smoky to reduce commercial exploitation of the black bear while enactment of the law requiring the wearing of hunter or blaze orange by the 1987 General Assembly is saving lives. Also, during this period our education programs have been giving teachers and students a better understanding of our wildlife and environment, and our youth hunting and fishing programs have taught wise and responsible use of these resources.

Our achievements during this biennial period have been marked by hard work and high esprit de corps, but this would not have been possible without your support, and the support of the legislature, sportsmen and concerned citizens. We sincerely express our appreciation, and pledge our continued efforts to ensure a sound future for our wildlife resources.

Respectfully yours,

Eugene Price

Eugene Price, Chairman

January, 1989
Volume 53, Number 1

State of North Carolina
James G. Martin / Governor

Department of Natural Resources and Community Development

S. Thomas Rhodes / Secretary

North Carolina Wildlife Resources Commission

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

North Carolina State Library
Raleigh, N.C.

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Cover *Every angler has his or her special spot, and this fisherman seems to have found his on fog-shrouded Lake Waccamaw. Photograph by Lawrence S. Earley*

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THE PEOPLE AND THE RESOURCE

Sole responsibility for the regulation of hunting, fishing and trapping in North Carolina is lodged with the N.C. Wildlife Resources Commission. It also manages the state's populations of game species. The 13-member Commission is headed by its chairman, Eugene Price. The Commission's executive director, Charles Fullwood, leads an agency made up of 479 employees in fields as diverse as biological research and law enforcement, education and administration.

Working with the people for wildlife—this has been the aim of the Wildlife Resources Commission since its establishment in 1947. The Commission's successes of the past two years reflect this endeavor.

DEBBIE CONGER

Executive Director Charles R. Fullwood

A meeting hosted by the Wildlife Commission during the biennium brought the needs of fish and wildlife to public view. In September 1987, the International Association of Fish and Wildlife Agencies, consisting of directors of fish and wildlife agencies from across the United States, met in Winston-Salem to discuss common problems facing all fish and wildlife administrators. Gov. Jim Martin addressed the group, calling for protection of the Albemarle and Pamlico sounds and hailing a five-year, $5 million study of that estuarine system.

During the biennium, several outstanding pieces of wildlife-related legislation were passed by the N.C. General Assembly. During the 1987 session, the legislature passed a bill requiring the wearing of blaze orange for certain types of big-game hunting. The new law has been credited with reducing hunting fatalities in 1987-88.

Another bill passed during the 1987 session was the Nongame and Endangered Wildlife Bill, which established the Wildlife Commission as the agency responsible for the conservation, management and enhancement of nongame wildlife in North Carolina. This landmark piece of legislation gives the Wildlife Commission authority to adopt and enforce regulations protecting nongame and endangered wildlife.

Also in 1987, the General Assembly raised fees for annual and lifetime hunting, fishing and trapping licenses. These fees will generate about $3 million in additional revenues annually to help fund ongoing programs. The General Assembly also required state waterfowl licenses for duck hunters, a provision which will add an estimated $150,000 to the waterfowl-management program.

The additional funds will be added to those raised by the Wildlife Endowment Fund, which has raised over $15 million in principal through the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina* magazine, and tax-deductible donations. Only the interest is used to support research, management and other wildlife programs. The Wallop-Breaux expansion of the Dingell-Johnson Fund generated additional monies during the biennium that resulted in the renovation of several boating-access areas.

The Commission's game and fisheries programs also made progress in important areas during the biennium. Its efforts to restore wild turkeys to their former range met with remarkable success in 1988, as the harvest total jumped to a 40-year high. In other outstanding Commission programs, biologists coordinated state efforts with the North American Waterfowl Management Plan to raise waterfowl populations from their current lows. Fisheries biologists continued to work with other state agencies and universities to restore the state's declining striped bass population. Also during the biennium the Wildlife Commission established North Carolina's first list of endangered and threatened mammals.

Education continues to be ever more important as the Wildlife Commission seeks to alert the people of North Carolina to the problems of wildlife and wildlife habitat in the state. Several programs are directed specifically at children. Project WILD is a highly effective and popular environmental-education program for teachers. Commission employees work with children on a direct basis through the CATCH Program—Carolina Anglers Teach Children How—and through hunter and boating safety programs which it administers. Each year, the Commission also sponsors several popular dove and deer hunts for young people across the state.

Law enforcement efforts have reached a high plateau through new and improved equipment and greater penalties for convictions, including license revocation, higher fines and replacement costs. Wildlife enforcement officers joined with agents from federal agencies in working a sting operation that curbed the illegal trade in bear parts in the mountains of North Carolina.

As the Wildlife Commission looks back over the successes of the past biennium, it anticipates continuing to work in the future with sportsmen and conservationists to enhance the welfare of the state's wildlife and provide opportunities for sporting.

***The North Carolina** Wildlife Resources Commission. Front row, left to right: Eddie C. Bridges, Allan D. Miles Sr., Eugene Price (Chairman), Robert E. Barnhill Jr. (Vice-Chairman), M. Woodrow Price, John F. Lentz. Back row, left to right: Dr. Jack Hamrick, Dr. William H. McCall, R. Reed Allen Jr., Robert W. Hester, Donald Allen Thompson, Howell W. Woltz, Stuart R. Paine.*

MELISSA McCAW

ENFORCEMENT

Over the past two years, the Division of Enforcement has experienced an approximately 50 percent turnover in its top administrative and supervisory positions. This change has given veteran wildlife officers with some new ideas a chance to have an effect on the direction wildlife and boating enforcement is taking in North Carolina. Improvements in the Division of Enforcement have occurred from top to bottom and have resulted in more effective wildlife law enforcement and higher apprehension rates.

Understanding that major wildlife violations may not be detected by routine patrols and operations, the Division of Enforcement continues its close cooperation with the U.S. Fish and Wildlife Service and other state wildlife agencies on investigations and undercover activities. Recently, a major undercover operation dubbed "Operation Smoky" cracked down on poaching and illegal sales of black bears and bear parts in the North Carolina, Tennessee, and Georgia mountains. The investigation also resulted in arrests for other charges including hunting on park lands, selling stolen vehicles, and bootlegging.

The demand for bear claws and body parts destined for use in jewelry and foreign medical remedies is just part of the illegal trade in wildlife that can threaten species already stressed by human encroachment. Wildlife enforcement agencies, which traditionally have played the role of game managers, must be able to react to modern-day problems that threaten wildlife species. Wildlife enforcement officers must continue to use all resources and technologies at their disposal to keep pace with those who would exploit wildlife for personal profit.

North Carolina is recognized by wildlife agencies as an innovator in the use of aircraft to detect wildlife, fishing, and boating-law violations. Aircraft also are vital in making surveys of waterfowl and sea turtles and assisting in search-and-rescue operations for missing hunters and boaters.

In 1987, Division of Enforcement aircraft flew a total of 2,007 hours and assisted in 630 arrests with over 100 of these arrests being for hunting deer at night. Statistics indicate that one wildlife arrest is made for every 3.18 hours flown. These statistics are even more noteworthy as two of our four Piper Super Cub aircraft used in wildlife law enforcement have been out of service for major maintenance periods. Bad news to poachers and wildlife law violators is that all four aircraft should be back in operation during the fall and winter of 1988.

One of our biggest changes taking place in the Division is the automation of our Raleigh office. Computer printouts from officers' activity reports enable supervisors to have immediate access to work activities, hours worked, violations detected, and operating costs. The information identifies areas where more attention is needed and also promotes a uniform and fair means of reviewing performance of individual officers and districts.

Personal computers are also paying big dividends by reducing the secretarial work load while at the same time allowing the Division to increase its output and decrease the response time for replies. We plan to add additional PCs to our office work stations during the coming biennium and eventually tie them into our field operations.

Inventories of clothing stocked at our warehouse are being reduced by our office automation efforts which allows us to order the exact numbers and sizes of needed items. By reducing our inventories and overhead costs, we are able to stretch our clothing budget and order better quality and additional uniform items. New additions include: winter waterproof boots, summer lightweight boots, insulated coveralls, top coats, down vests, and gloves. These items not only are improving officer comfort and appearance but also are enhancing job performance and morale. Officers are finding it easier to remain on sub-freezing night stakeouts and these efforts are being reflected in more cases of deer firelighting and other violations being brought to court.

Our toll-free WILDLIFE WATCH telephone number continues to be a big assistance in receiving reports of game violations and responding to these calls. We frequently are able to respond to calls and witness violations in progress thanks to the telephone reporting system, improved radio communications, and the concerned citizen.

The Division of Enforcement also is responsible for directing the state's hunter and boater-education programs. Under the direction of a full-time coordinator, established during the biennium, both programs have made improvements. This coordinator works with lieutenants assigned to our nine wildlife districts and has made them more uniform. Improvements made in the programs this year include: training and certification of our lieutenants;

Parked in the gathering dusk of evening, wildlife enforcement officers prepare for a long, lonely and often cold night on stakeout in an area where nocturnal wildlife violations are anticipated. Illegal firelighting of deer is one of the most common night violations.

KEN TAYLOR

ENFORCEMENT

JANE ROHLING

***Lieutenant Bruce** D. Byrd meets with a group of sportsmen as part of a long day of varied duties as a wildlife officer. Not all of these duties are so pleasant, and some are dangerous.*

more training and recognition for volunteer hunter education instructors; publishing and mailing a quarterly newsletter to volunteer hunter-education instructors; upgrading course materials; locating and purchasing new films on hunting and boating safety; assigning boating safety videotapes to each district to use; and rewriting the boating education course book and developing an instructor's guide.

During the past biennium, 47,624 individuals were certified as completing the North Carolina Hunter Education Course. During this same period the Boating Education Course was offered to 155,285 students through our school system. While these figures are impressive and both lead the nation for volunteer education courses, the results of these efforts are even more impressive—the number of hunting fatalities in 1987 dropped to its lowest recorded level and boating deaths for the past two years are at their lowest recorded level despite a tremendous increase in boats and people on the water.

Wildlife legislation enacted by the 1987 session of the North Carolina General Assembly includes a requirement that hunters, using firearms, must wear a cap or outer garment of hunter orange while hunt-

JANE ROHLING

***Wildlife officer** John E. Hall checks fishing licenses, creel limits and required boat safety equipment on a lake in the Piedmont.*

ENFORCEMENT SUMMARY
July 1, 1986—June 30, 1988

Hunting	
Checked	205,820
Citations issued	10,701
Warnings issued	1,564

Fishing	
Checked	417,339
Citations issued	18,732
Warnings issued	2,954

Boating	
Checked	219,536
Citations issued	10,340
Warnings issued	19,201

Other	
Special investigations	315
Wildlife pickups	3,051

ing bear, deer or wild boar. Violators of this law are charged with an infraction and fined. Getting the word out on the new requirement continues to be a major part of our hunter-education efforts.

Because of the thorough knowledge of lakes, rivers, and forests which wildlife officers acquire in their areas, and the agency's unique position of having officers on land, water, and in the air, the Division of Enforcement frequently has been called on to assist in emergencies and threats to public safety. During the past biennium, wildlife enforcement officers assisted in tracking down sources of hazardous chemical spills as well as desperate criminals. Our officers have joined forces with other state and public safety officials and battled forest fires and hurricanes and have been identified as playing a major role in emergency preparedness plans for nuclear power plants.

Whether on patrol on land, water or in the air the wildlife enforcement officer is the first line of defense for our wildlife resources. These officers are charged to enforce wildlife laws vigorously, fairly, and impartially. The job has its dangers, its rewards, and the satisfaction of knowing that it perpetuates our wildlife heritage. And as a wildlife enforcement officer once put it, it gives a person the opportunity to work with some of the finest people in the world — the North Carolina sportsmen.

MANNING THE FRONT LINES

There's probably no Wildlife Commission employee that's more visible to the public than the wildlife enforcement officer. It's that visibility, says Lieutenant Michael Lambert, that helps make the job so interesting but also strenuous.

"You're constantly checking sportmen's hunting licenses and boating licenses and you're constantly out there in front of the public. You're always conscious of that."

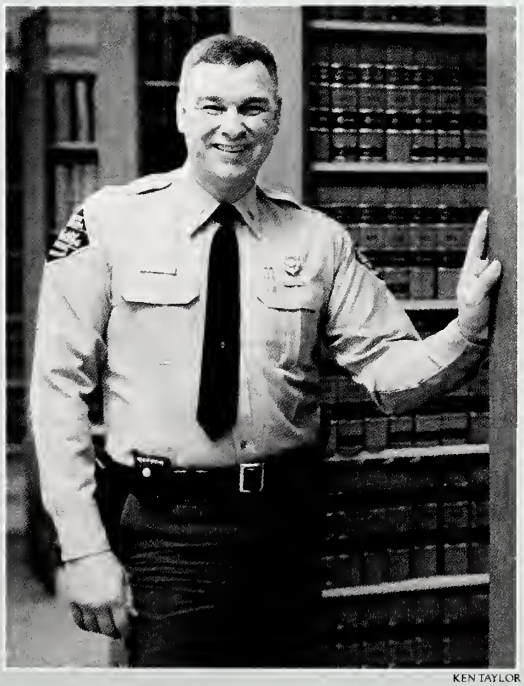
Lambert's position is perhaps less visible than it once was. The Albemarle lieutenant now oversees the operations of two sergeants and about 10 officers in District 6, coordinating patrol areas and working up reports. "Learning how to operate my new computer has helped me do my job a lot better, but it's about to drive me crazy," he says.

His responsibilities also include heading the hunter-education efforts in his counties. At one time he taught hunter-education classes himself. "We found it better to hold instructor workshops to certify volunteer instructors," he says. "We send out letters trying to get public school teachers to attend them and once they are certified, they can run hunter-education in that school."

"Hunter-education is vitally important," Lambert adds. "Young people need to be educated toward safety in the field and toward wildlife conservation. And I'm proud of the fact that we've got one of the strongest shooting programs in our district. A couple of our high school teams have won national awards for their proficiency."

Lambert says that he can already see the benefits of the hunter-education courses in his district. "People with hunter-education courses are more safety conscious with firearms and they have more respect for game."

Does he have a time of year that's busier than others? "We stay busy," he says. "In the Piedmont, one hunting season overlaps another so we stay busy just about year round."



KEN TAYLOR

Michael Lambert

"Young people need to be educated toward safety in the field and toward wildlife conservation."

WILDLIFE MANAGEMENT

Studying the status and health of wildlife populations is the responsibility of the Division of Wildlife Management. Staff biologists analyze and make recommendations to assure an adequate harvest of game animals within the capacity of each species. Other objectives include managing habitat on public game lands and providing technical guidance through extension activities to landowners across the state. In cooperation with the Nongame Advisory Committee, the Division develops sound programs for nongame and endangered species. A top priority is preventing the destruction of wetland habitats.

The following reports highlights accomplishments of the Division in its major program areas.

JANE ROHLING

Sandhills field trial puppies.

BIG GAME

Research on white-tailed deer, black bear and wild turkey continued at a rapid pace. Contracts with university researchers totaled over $75,000 during the biennium. The objectives of this research have practical implications for the management of each species. A research project that examined factors limiting deer distribution and density in selected mountain habitats was completed during the past two years. Much valuable information was collected pertaining to habitat variables and their impacts on deer condition. This information should result in better management of mountain deer herds. Following a large wildfire on Holly Shelter Game Land, a study examined the impact of fire and management of habitats on pocosin deer.

Populations of deer and wild turkey continued to grow. This positive trend indicates that research and management efforts are working well to provide excellent recreational opportunities for big-game hunters in our state.

SMALL GAME

During the biennium North Carolina hosted the first region-wide workshop devoted to small game. Researchers and managers from 13 southeastern states met in the Shearon Harris Environmental Center in Raleigh to report on current projects and to discuss region-wide declines in small-game populations. Quail survey techniques, no-till farming research, the 1985 Farm Bill, and current research needs were among topics covered.

Work continues on the Penny Bend Research area near Durham. Current research is focusing on the potential influence of predation in limiting low-density rabbit populations. Biologists are beginning an enclosure study, which will exclude mammal predators, and a telemetry study to determine rabbit survival rates.

Surveys to monitor breeding and fall bobwhite populations are continuing. Hunter surveys and early summer call-count surveys indicated that quail populations in eastern North Carolina are faring much better than those in the Piedmont and Foothills. Increasing development and changing farming practices in the Piedmont and Foothills continue to reduce quail habitat and hunting opportunity.

MIGRATORY BIRDS

Commission waterfowl biologists were challenged this biennium to find solutions to problems confronting waterfowl populations. Some of these problems are the prolonged drought conditions in duck-breeding grounds, changes in the distribution of wintering populations, degradation of wintering habitats, and excessive disturbances of the birds.

A number of new habitat initiatives are being financed by the waterfowl stamp and print program and other funding sources. Over 6,000 acres of key agricultural habitats have been leased for waterfowl feeding and resting areas statewide. These sites are intended to improve conditions for Canada geese but they also benefit many other species. Management practices on these areas include leaving stubble and a portion of the crops unpicked to benefit the birds. A new waterfowl habitat specialist position was developed to provide assistance to both private landowners and organizations needing technical assistance in managing their land for waterfowl.

Canada goose management programs are benefiting greatly from the Flyway Goose Research Project which the Commission has participated in since its beginning in 1983. Over 27,000 Canada geese in nine Atlantic Flyway states have been neck-collared to date, resulting in information on surviv-

BIG GAME HARVESTS

	1984-1985	1985-1986	1986-1987	1987-1988	1988-1989
White-tailed Deer	42,642	46,215	52,122	74,761	—
Wild Turkey	422	509	540	680	1,027
Black Bear	482	316	421	561	—
Wild Boar	127	79	177	129	

KEN TAYLOR

Donald Watkins *and his Brittany meet with success at a quail hunt near Kinston. Wildlife Management biologists are monitoring bobwhite populations statewide. Other small game research continues at the Commission's Penny Bend Research Area near Butner.*

al, movements, and flock affiliations of geese. Other studies have resulted in banding geese on the arctic breeding grounds and in estimating goose breeding in North Carolina and other states.

FURBEARERS

The Commission continues to improve its ability to monitor furbearer populations in the state. During the biennium, biologists used scent-station surveys, mail surveys, fur dealer surveys, stream surveys, and raccoon club surveys to determine the population status and harvest levels for a number of furbearer species. New survey and harvest-monitoring techniques are continually being developed and evaluated to obtain accurate information to manage our furbearer resource.

Intensive stream surveys in western counties indicated that among the watersheds with no river

COMPARISON OF NORTH CAROLINA FUR HARVESTS

Species	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
Beaver	363	776	943	1,078	518	535	604	888	1,340	1,379
Bobcat	860	727	874	514	625	825	678	748	673	460
Groundhog	61	120	82	6	8	22	6	30	0	0
Mink	2,232	2,611	3,817	1,692	1,757	1,367	1,150	928	1,021	861
Muskrat	55,630	70,775	83,269	48,468	39,744	37,806	45,117	26,972	25,228	25,073
Nutria	2,235	2,663	1,938	743	874	1,774	1,709	1,194	1,067	2,047
Opossum	21,592	33,637	16,413	8,090	6,885	2,869	3,377	2,866	3,703	1,635
Otter	1,304	1,618	1,679	870	919	869	630	685	785	689
Raccoon	88,774	98,968	112,420	88,122	115,032	91,971	81,326	70,966	70,525	63,445
Skunk	856	716	390	91	65	59	41	50	57	22
Weasel	125	137	89	24	11	22	17	6	3	18
Fox	10,715	13,185	4,427	222	115	1,424	1,832	4,192	3,743	2,872
Other	87	156	39	0	0	2	0	0	0	0
TOTAL	**184,834**	**226,089**	**226,380**	**149,920**	**166,553**	**139,545**	**136,487**	**109,525**	**108,145**	**98,501**

MIDWINTER WATERFOWL COUNTS IN NORTH CAROLINA, 1984-1988

Species	1984	1985	1986	1987	1988	Percent Change From 1987	% From 38 Yr. Ave.
Dabbling Ducks	65,900	55,600	85,600	58,100	91,700	+57.8	-7.9
Diving Ducks	95,400	86,500	109,500	99,000	56,500	-42.9	-42.8
Mergansers	1,200	8,900	30,800	20,000	11,900	-40.5	-16.8
Coots	9,400	17,100	11,200	20,700	26,700	+29.0	-48.8
Sea Ducks, Misc. and Unidentified	1,000	3,500	6,500	3,200	1,600		
Tundra Swan	44,100	61,500	52,300	53,500	46.800	-12.5	+103.3
Canada Goose	26,600	19,100	22,800	20,100	21,400	+6.5	-75.8
Snow Goose	16,000	14,200	16,300	12,500	16,800	+42.4	-41.4
Brant	300	2,400	500	100	500	+400.0	-37.4
TOTAL	**259,900**	**268,800**	**335,500**	**287,200**	**273,900**	**-4.6**	**-33.7**

WILDLIFE PLANTING MATERIAL DISTRIBUTION
DIVISION OF WILDLIFE MANAGEMENT 1987-88 Fiscal Year

District	Number of Cooperators	Annual Seed Units (5 lbs.)	Perennial Seed Units (2½ lbs.)	Millet (Pounds)	Shrub Seedlings	Serica Units (2 lb.)
1	476	1,510	700	900	6,100	100
2	503	2,000	1,100	900	5,000	100
3	216	1,111	598	75	2,000	88
4	260	1,302	599	0	0	97
5	1,386	3,714	1,150	0	50	100
6	1,176	3,400	1,100	0	30	240
7	987	3,571	1,999	0	8,000	0
8	718	2,241	1,478	0	6,400	638
9	526	1,150	1,400	75	0	700
TOTALS	**6,248**	**19,999**	**10,124**	**1,950**	**27,580**	**2,063**

otter populations, several had forage and habitat sufficient to support otters. These streams were included on a list for possible future otter reintroductions.

The beaver population continues to expand in North Carolina, creating new wetland habitat as well as problems for some landowners. A booklet, *Beaver Management in North Carolina*, was published and made available to the public during the biennium. This booklet provides information on beaver habitat, managing beaver ponds for wildlife, preventing and controlling beaver damage, and processing beaver fur.

LAND MANAGEMENT

Wildlife Commission employees work to enhance wildlife habitat both on Commission game lands and in state-owned forests. Biologists also work with private landowners to improve wildlife habitat on their land.

The Game Lands Program includes 1.8 million acres of private, corporate, federal and state lands. Over 50 major cooperators are paid to participate.

LEONARD LEE RUE III

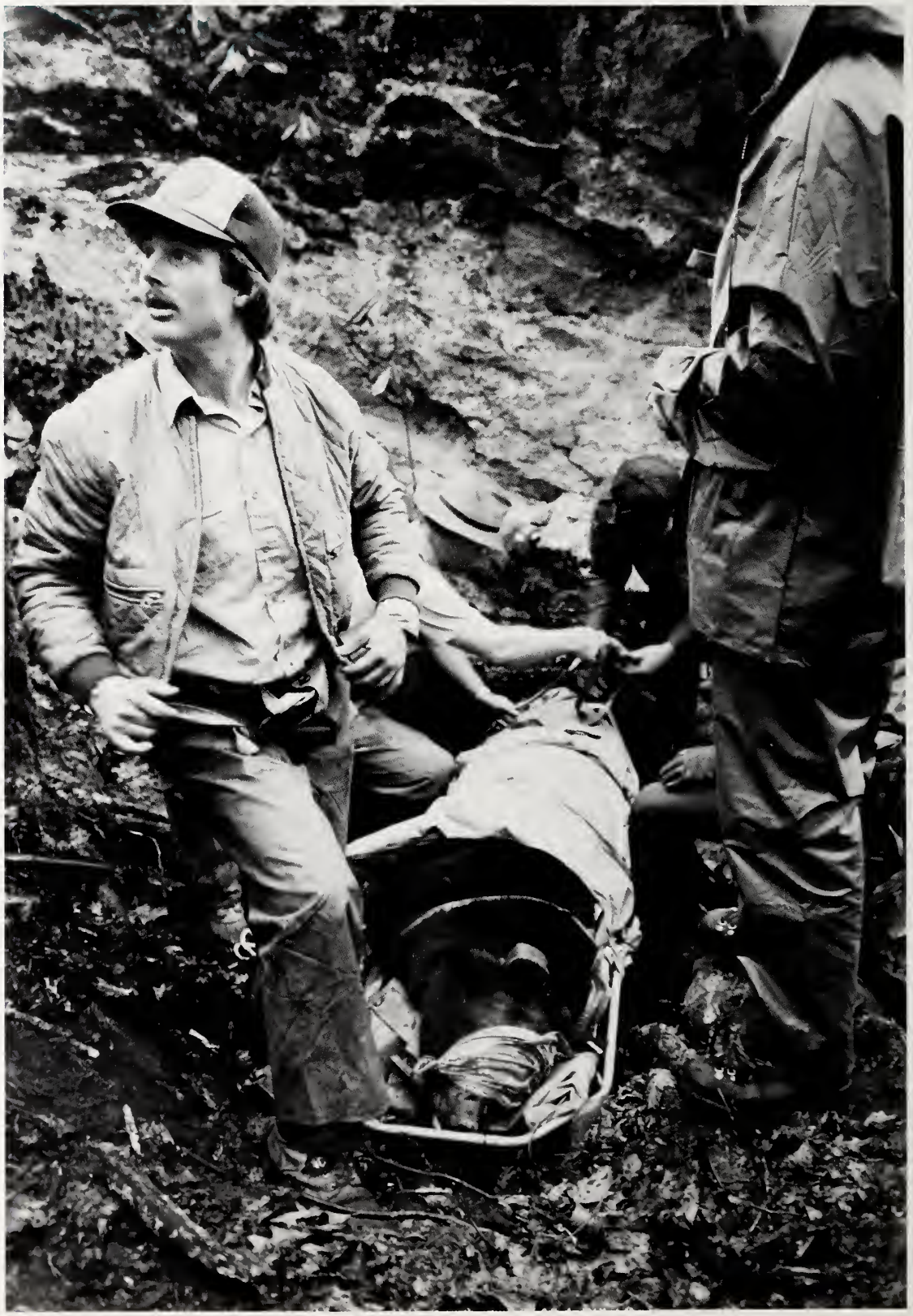
White-tailed *deer continue to maintain generally high population levels throughout the state. Biologists are studying the factors that limit deer distribution in mountain habitats in order to improve management of mountain deer herds. Deer hunting remains one of the best sporting opportunities in North Carolina.*

JANE ROHLING

Biologists collar *Canada goose in Guilford County as part of the Flyway Goose Research Project. Over 27,000 geese have been collared in the nine Atlantic Flyway states. Information gained from this project help goose-management programs throughout the Flyway.*

WILDLIFE MANAGEMENT

***Black bear** being relocated in the Pisgah Mountains. Personnel from the Wildlife Commission, the U.S. Forest Service and N.C. State University cooperated on this project.*



JAY DAVIES

A variety of activities occur across four regions established for the administration of the program.

In the Coastal Region, there are 20 waterfowl impoundments comprising 3,455 acres. Water levels are maintained at optimum stages utilizing large, diesel-powered pumps. Coastal Region personnel also manage over 100,000 acres of state-owned lands and maintain over 417 miles of boundary lines and 76 miles of roads. Coastal-management technicians planted 495 acres in various food mixtures for wildlife and prescribe-burned 4,220 acres to improve habitat. A number of game and nongame animals are dependent on plant species in coastal areas which can only be maintained by frequent burning.

Personnel assigned to the Central Region planted 17 varieties of wildlife foods on 4,328 acres and mowed 495 acres to improve habitat on 25 game lands. Foresters and technicians prescribe burned 16,368 acres to improve wildlife habitat and to remove litter and brush from the forest floor.

At the Butner and Sandhills nurseries, 23 varieties of seed were grown and processed into 76,486 units of wildlife planting materials totaling over 422,000 pounds. These wildlife planting materials were distributed statewide for the general public and for use on game lands. In the Central Region, 22,653 units were distributed to 5,436 cooperators.

Commission technicians in the Northern Region manage 300,000 acres of leased and state-owned land. Game land road developments in this region included the maintenance of 27 miles of roads. Over 6,000 feet of new roads were constructed and 13 culverts were installed. This construction was needed to relocate a road grade, to close out steep and eroding sections and to maintain water quality. These roads provide hunter access and are essential to the management of wildlife and timber on two state-owned areas, the Green River and Thurmond Chatham game lands. Wildlife habitat improvements included the seeding, mowing and fertilizing of over 1,000 acres of wildlife openings.

In the Western Region three mobile wildlife-management crews and two biologists are responsible for habitat management on 771,015 acres of game lands. These crews coordinate with six U. S. Forest Service ranger districts to improve wildlife habitat. During this period, regional management crews maintained 618.1 miles of boundaries by posting. A total of 986 acres of permanent wildlife

THE PERSONAL TOUCH

Autumn finds Bobby Hilton in Crossnore with other wildlife technicians repairing front-end loaders, tractors and bush hogs. When it comes to managing and enhancing habitat on the Wildlife Commission's game lands, these bulky machines are surprisingly the tools of choice for Hilton.

Hilton spends most of the year improving big-game habitat on game lands in Burke, Avery, Caldwell, Ashe and other mountainous counties in Districts 7 and 8. He cuts wildlife openings in game lands and seeds grass and clover for deer and other animals. "On a lot of areas on national forests that the U.S. Forest Service bought, there were old homesteads with apple trees and fruit trees," Hilton says. "We maintain them for wildlife. We have as many as 200 trees in one orchard and they get a lot of use, especially by deer and bear."

Although managing wildlife habitat is the focus of his work, Hilton confesses he gets a lot of pleasure working with hunters as well. In the fall he sometimes accompanies parties of bear hunters in remote areas, collecting teeth and reproductive tracts for research.

"Folks up here didn't like the bear sanctuaries at first, because they limited their ability to hunt," Hilton says. "But now they're seeing the good things that the sanctuaries have done and they say it's the best thing that we've ever done.

"We get on a personal level with hunters," Hilton says. "They tell us what's on their minds and we answer questions. I enjoy the personal contact. It's a relationship that probably does a lot of good for the Wildlife Commission. A lot of wildlife-management practices need to be taught to hunters, and the best way to do it is on a one-to-one basis."

KEN TAYLOR

Bobby Hilton

"Folks up here say the bear sanctuaries are the best thing we've ever done."

WILDLIFE MANAGEMENT

JAY DAVIES

Biologists A.E. *Ammons and Joffrey Brooks talk with E.J. Whitmire (left) on his Cherokee County farm. Biologists offer technical advice to farmers to improve the wildlife habitat on their farms. These contacts often result in increased wildlife populations.*

openings were scattered throughout the region's game lands. Additional acres of seeded logging roads are maintained in wildlife food plots. Wildlife habitat management practices during the biennium included mowing 2,378 acres, seeding or fertilizing 611 acres, removing rocks and debris from 272 acres, and maintaining 145 acres of wildlife openings.

Forestry on state-owned lands is an important part of the game-lands program. Four foresters are assigned to this program to demonstrate that good forestry can increase wildlife populations. Income from this program is a significant source of funding which helps pay a portion of the total annual cost of wildlife management. During the reporting period, revenue from the sale of timber and other forestry-related products totaled $834,677. Managed timberlands totaled just under 200,000 acres.

Additional lands are now being surveyed and inventoried under this program. They are the recently acquired Roanoke River wetlands and tracts allocated to the Commission as part of the Falls Lake and B. Everett Jordan projects. We are excited about new opportunities to demonstrate coordinated timber/wildlife management on sensitive wetland areas and on areas that also receive intensive recreational use. The need to address increasing mul-

tiple use demands on a limited land base is a challenge worthy of any manager's best thinking and efforts.

HABITAT CONSERVATION

The primary mission of the Habitat Conservation Project is to protect wildlife habitat by participating in the State's environmental-review process. Environmental reviews are generally required when a development proposal involves licensing, funding, permitting, or other action by state and federal agencies. One of the Project's most significant accomplishments during the last biennium was the completion of a document titled "Policies and Guidelines for Wetlands and Aquatic Habitat Conservation". Its purpose was to ensure consistency in habitat protection across the state. A workshop for Commission biologists was held in conjunction with the document's preparation to familiarize them with environmental regulations, policies, and guidelines. The document and the workshop were developed jointly with the Division of Inland Fisheries.

NONGAME AND ENDANGERED WILDLIFE

Funding through the state income tax checkoff has continued to increase. Initial funding from the checkoff in 1984 generated $230,000 and since then receipts have increased to $392,000 in 1987 with a projected total of $403,000 in 1988. This continued public support has allowed the Commission to expand the Nongame Program and include much needed work on nongame species.

Major nongame emphasis during the past biennium continued to be directed toward bald eagles, peregrine falcons, sea turtles and Project WILD. New projects were initiated and completed on the Tar River spiny mussel, the spotfin chub and the Virginia big-eared bat.

Thirty-three bald eagles have been released at the Lake Mattamuskeet National Wildlife Refuge in Hyde County since this project began in 1983. Its objective is to re-establish a breeding population of at least 10 nesting pairs of bald eagles in North Carolina. Thus far, three natural bald eagle nests have been located in North Carolina, in Hyde, Washington and Beaufort counties. Thirteen young eagles have been produced in these nests.

The summer eagle roost at Lake Jordan continues to attract birds as well as people. Because of this intense interest, the Commission, in conjunction with New Hope Audubon, has developed an eagle watch area on Jordan Lake. The area includes a parking lot, a hiking trail and a bird-watching platform. This wildlife area continues to attract not only people from North Carolina but also many out-of-state residents. Thus far, 990 people have signed in at the site from 20 states and have included visitors from Germany, Guatemala and England.

During the two-year Tar River spiny mussel survey, 93 sites were inspected in the Tar River basin. Even though 7,000 mussels were identified, only seven spiny mussels were located. Future work with this endangered species is concerned with protecting aquatic habitat and thereby protecting this mussel and other aquatic species in the Tar River drainage basin.

At the national level, the Nongame Program helped produce an aquatic supplement to Project WILD, an environmental-education program for teachers. North Carolina was the host state for the southeastern United States writing workshop. Nongame personnel helped staff the national and regional committees that were responsible for organizing and writing the supplement.

A total of 63 peregrine falcons have been released in the mountains of western North Carolina since the project began in 1984. One bird returned in 1985, three in 1986, six in 1987 and 12 in 1988. There was one breeding attempt in 1987 and three in 1988 which produced two birds to fledging age. It is not likely that all nesting peregrines were located during the 1988 nesting season.

During the biennium 309 sea turtles were recovered from North Carolina beaches. Biological data from all these turtles were recorded and forwarded to the National Marine Fisheries Regional Office for inclusion in their international report. In addition, data were collected from 852 nesting loggerhead sea turtles. Sea turtle volunteers who work cooperatively with staff personnel collected much of this information.

In cooperation with Wake Forest University, the Nongame Program has been conducting a status survey for northern flying squirrels. Resident populations have been rediscovered in all historic trapping locations and three range extensions have been discovered during this study. This extraordinary trapping success suggests that current population levels are high. It is not known at this time whether this is due to high reproductive success or low mortality.

KEN TAYLOR

Peregrine falcon

BOATING AND INLAND FISHERIES

Working for the boater, angler and the fisheries resources is the responsibility of the Division of Boating and Inland Fisheries. Personnel develop and maintain boating facilities statewide and manage aquatic habitats and fisheries resources in inland waters. They construct and maintain access areas for boaters and bank fishermen, and also maintain waterway markers. Biologists conduct research and surveys of fish populations, operate fish hatcheries, develop and evaluate fishing regulations and improve fish habitat. They also advise private pond owners, present public programs and work with sportsmen's groups on a variety of projects. In addition, they are called on to review and comment on proposed projects that threaten aquatic habitats.

The following report describes the Division's programs and accomplishments during the past biennium.

N.C. WILDLIFE RESOURCES COMMISSION

***For this young** girl, happiness is catching that first bluegill.*

BOATING FACILITIES PROGRAM

During the 1986-88 biennium, three new boating access areas were constructed, bringing the total number of Commission-operated areas to 154. The new areas are located in Brunswick County on Rice's Creek, in Jackson County on Thorpe Reservoir, and in Bertie County on Cashie River.

Five areas received major renovations that included the replacement of ramps and docks and other work. These five areas were Poplar Branch in Currituck County, Oak Island in Brunswick County, Gaston Reservoir, Avents Ferry in Chatham County, Belhaven in Beaufort County, Castle Hayne in New Hanover County and the Nutbush Creek bridge in Vance County.

New funds, generated by the Wallop-Breaux amendment to the Dingell-Johnson Act in Congress, were used to improve the general maintenance of all other access areas. These funds purchased additional maintenance supplies and materials for areas that were in particularly poor condition, and also bought maintenance equipment such as tractors, backhoes, roadgraders and equipment trailers.

Boating staff members are also responsible for placing and maintaining navigational buoys on inland waters across the state. During this biennium approximately 750 buoys were maintained. Those buoys serve as navigational aids to boaters by identifying channels, hazardous obstructions, congested areas and no-wake zones.

TECHNICAL SERVICES PROGRAM

North Carolina's 100,000 private ponds receive a great deal of fishing pressure and represent a significant portion of the state's fisheries resources. Biologists offer free technical assistance or management advice to pond owners, a major portion of the Division's Technical Services Program. During the past biennium, biologists provided technical assistance to 1,734 pond owners throughout the state.

HABITAT CONSERVATION PROGRAM

The welfare of fish and wildlife resources depends on habitat. To protect the state's fish habitat, the staff reviews and makes recommendations on nearly 800 projects a year that have a potential impact on habitat.

An area of special concern during the biennium was the continuing loss of wetlands. Wetlands provide important habitat for a broad range of fish and wildlife species, and they serve a number of other valuable services. Wetlands store floodwaters, control sediment and pollution, recharge ground water and provide recreation to the public. Riparian vegetation associated with wetlands serves to control the flow of sediment and chemicals from agricultural land into stream channels. In many areas of North Carolina the only remaining wildlife habitat occurs in narrow riparian fringes. Riparian wetlands become more important to wildlife as human encroachment reduces overall habitat acreage or quality.

Wetland losses nationally averaged over 450,000 acres per year during the 20-year period from the 1950s to the 1970s, with North Carolina experiencing significant losses. Major conversions of coastal and freshwater wetlands have occurred because of agricultural and silvicultural expansion, industrial development, and urban encroachment, including resort communities.

During the biennium, wetland preservation was a high priority. Habitat Conservation staff prepared a document, "Policies and Guidelines for Conservation of Wetlands and Aquatic Habitats," for use by fish and wildlife biologists.

RESEARCH AND SURVEY PROGRAM

Coastal Region

Declines in the numbers of anadramous striped

JIM DEAN

***Fishing comes** close to being the perfect outdoor sport for everyone, a wholesome and challenging way to spend time in handsome, natural surroundings. These trout fishermen are trying their luck on one of the state's streams managed under special regulations to maintain wild trout populations.*

PIEDMONT REGION DEVELOPMENT ACTIVITY SUMMARY FOR THE 1987-88 BIENNIUM
(July 1, 1986—June 30, 1988)

		Habitat Enhancement			Angler Access Improvement		
Body of Water	County	Fish	Attractors Trees/ Attractor	Trees Cut & Cabled	Public Fishing Area (Cap.)	Bank Clearing (Miles)	Fishing Platforms
Badin Lake	Stanly	24	740	9	1 (20)	0.50	—
Cane Creek Lake	Union	6	240	56	— —	—	—
Lake Townsend	Guilford	12	450	20	— —	—	—
Reidsville Lake	Rockingham	4	80	36	— —	—	—
Crappie Lake	Richmond	6	60	—	— —	0.20	—
Baggett Lake	Richmond	10	100	—	— —	0.10	—
Falls Lake	Wake	6	600	—	2 (50)	0.50	5
Lake Thom-A-Lex	Davidson	6	50	—	— —	—	—
Tar River	Edgecombe	—	—	—	— —	0.25	—
TOTAL		74	2,320	121	3 (70)	1.55	5

COASTAL REGION DEVELOPMENT ACTIVITY SUMMARY FOR THE 1987-88 BIENNIUM
(July 1, 1986—June 30, 1988)

		Habitat Enhancement	Angler Access Improvement	
Body of Water	County	Fish Attractors	Bank Clearing (Miles)	Stream Obstruction Removal (Miles)
Black River	Sampson	—	—	20.0
South River	Bladen	—	—	13.0
Contentnea Creek	Pitt	—	—	13.0
NE Cape Fear River	Pender	—	—	1.5
Shelter Creek	Pender	—	—	2.5
Conoho Creek	Martin	—	—	1.5
Kinney-Cameron L.	Scotland	—	0.30	—
Scotland Lake	Scotland	—	0.75	—
Crawford Lake	Scotland	—	0.10	—
Gum Swamp Lake	Scotland	—	0.10	—
Chowan River	Gates	—	0.50	—
Scuppernong River	Tyrrell	—	0.30	—
Knobbs Creek	Pasquotank	5	0.10	—
Lake Rim	Cumberland	20	0.50	—
Glenville Lake	Cumberland	20	—	—
TOTAL		45	2.65	51.5

MOUNTAIN REGION DEVELOPMENT ACTIVITY SUMMARY FOR THE 1987-88 BIENNIUM
(July 1, 1986—June 30, 1988)

		Habitat Enhancement			
Body of Water	County	Fish Attractors	Trees Cut & Cabled	Bank Seeding (Acres)	Stream Improvement Devices
Lake James	McDowell	70	—	2.50	—
Glenville Lake	Jackson	7	—	1.00	—
Hiwassee Lake	Cherokee	8	—	14.25	—
Chatuge Lake	Clay	7	—	11.00	—
Nantahala Res.	Macon	8	—	1.50	—
Salem Lake	Forsyth	6	—	—	—
W. Kerr Scott Res.	Wilkes	1	51	—	—
Moss Res.	Cleveland	6	—	—	—
Lake Lure	Rutherford	3	—	—	—
Santeetlah Lake	Graham	5	—	—	—
Fontana Lake	Swain	—	30	—	—
Tom's Creek	McDowell	—	—	—	12
Scott Creek	Jackson	—	—	—	2
Fowler Creek	Transylvania	—	—	—	3
Pacolet River	Polk	—	—	—	20
Curtis Creek	McDowell	—	—	—	3
Shuler Creek	Cherokee	—	—	—	5
TOTAL		121	81	30.25	45

bass have spurred a major research effort by the Wildlife Commission in the coastal region. Several studies of larval striped bass were conducted on the Roanoke River in cooperation with East Carolina University. A creel survey on the river during the 1988 spring spawning season estimated the total harvest of striped bass by sport fishermen. Striped bass studies were also conducted on the Tar-Pamlico river system. These studies were designed to estimate the viability of eggs and the abundance of striped bass larvae. The abundance of food organisms available to larvae was determined as were the food habits of the larvae.

Crappie populations in selected tributaries of the Albemarle and Pamlico sounds are the focus of one ongoing study. Biologists are looking at the growth rates, population age and size structures as well as the effects of habitat on the catch rate. A study on the upper Trent River during the biennium compared the abundance, growth and food habits of major fishes, as well as the abundance of herrings and shad during spawning season. On the Cape Fear River, biologists responded to anglers' concerns that flathead catfish were responsible for the drastic decline in the river's sunfish population. By studying what the big catfish ate, the biologists found that catfish were not having a detrimental effect on the sunfish.

Piedmont Region

In the Piedmont, fisheries management takes place primarily on reservoirs. The Division has conducted research on both largemouth bass and crappie within the region during the biennium.

Largemouth bass research conducted on Falls-of-the-Neuse, Jordan, and Tuckertown reservoirs in the first year of the biennium laid the groundwork for size and daily creel regulation changes, which became effective on July 1, 1987. A 12 to 16-inch slot size limit and four-fish creel limit for bass were placed on Falls and Tuckertown reservoirs. The regulation prohibits keeping bass within the 12-16 inch size range. The change was designed to increase catch rates of large bass in both reservoirs. Concern over poor reproduction prompted the Commission to adopt a 16-inch size limit and four-fish creel limit for largemouth bass in Jordan Reservoir. The restrictive size limit will protect the small numbers of young bass being produced each year at Jordan Lake. Spring shoreline electrofishing samples are being conducted annually at all of the study lakes to

STRIPER HERITAGE

For most people, April may be a time to shake off winter's doldrums, but for fisheries biologists Bob Curry and Marshall Ray it means long days and nights at the Wildlife Commission's Weldon fish hatchery.

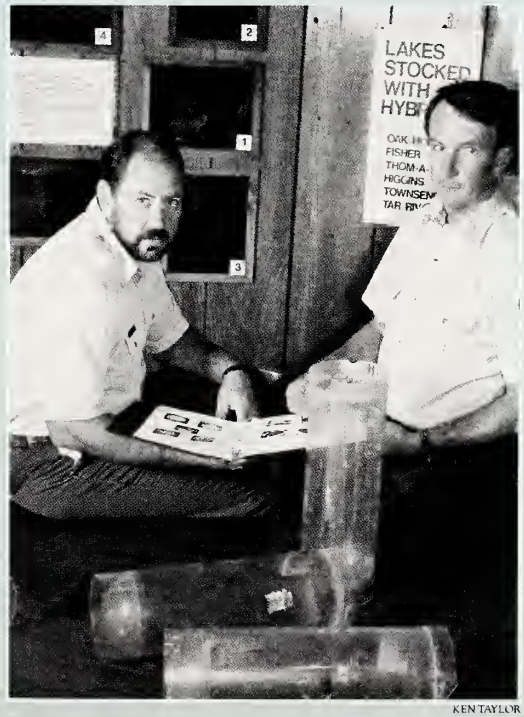
That's where spawning striped bass, or rock fish, are brought after being collected from their spring runs on the Dan and Roanoke rivers. Starting in mid-April and continuing for the next six weeks, Curry, Ray and a crew of fisheries technicians will artificially spawn about 75 stripers, each of which can produce several hundred thousand eggs.

"It can get a little wild at times," says Curry, Coastal Region fisheries development coordinator for the Wildlife Commission. "A couple of years ago, our water pumps broke down at 3 a.m. right in the middle of the spawn. We had 10 million eggs and no water. For 12 hours we used stocking trucks to haul water from the Roanoke to the hatchery until the pumps were fixed. We've worked as long as 36 hours at a stretch at the peak of the season."

Striper fry produced at Weldon are shipped either to the U.S. Fish and Wildlife Service's federal fish hatchery in Edenton for stocking in Albemarle Sound, or to the Wildlife Commission's Fayetteville hatchery. From here they are stocked in large reservoirs and small city lakes throughout the state and in several other states besides.

"We normally stock about 600,000 striped bass in our reservoirs, and nearly 400,000 Bodie bass—a cross between a female striped bass and male white bass—in the smaller lakes annually," says Ray, supervisor of fisheries technicians at Fayetteville fish hatchery.

Both men believe that their long spring nights at Weldon are worth the effort. Curry notes that protecting and enhancing public fishing is the major responsibility of the Division. He says, "As Division employees, it's our jobs to produce striped and Bodie bass fingerlings for North Carolina anglers to catch."



KEN TAYLOR

Robert L. Curry (left), Marshall C. Ray

"We've worked as long as 36 hours at a stretch at the peak of the season."

MARK TAYLOR

***A solution** to the declining striped bass fishery in Albemarle Sound and its primary nursery river, the Roanoke, is one of the major goals of the agency. Here, fisheries' biologists Pete Kornegay and Al Simpson sample the Roanoke for young stripers.*

determine if the objectives of the regulation changes are being met. Creel surveys and angler diaries are being conducted at Falls and Tuckertown to evaluate the impacts of the regulation on fishing.

Crappie research began in earnest in the fall of 1986. Fisheries biologists are sampling crappie populations in Falls-of-the-Neuse, Jordan, Brandt, Tuckertown, Thom-a-Lex, and Badin reservoirs with trap nets each fall. Crappie are popular sport fish but we have not had a reliable way to collect information about crappie populations. The fall sampling is an attempt to determine if fall trap netting can meet this need.

A cooperative study between biologists from the Wildlife Resources Commission and N.C. State University was begun during the biennium at Jordan Lake. Biologists are studying water quality and habitat, prey species (primarily shad) and predators (largemouth bass, crappie, and Bodie bass) hoping to understand how the various components of a reservoir fish community relate one to another. The work is also examining what factors are important to successful fish reproduction, particularly focusing on largemouth bass.

Mountain Region

The Mountain Region offers the most diverse fishing opportunities in the state. You can fish for native brook trout in a cold mountain stream, for muskie in fast moving river, for smallmouth bass or walleye in a clear reservoir,or for flathead catfish in a turbid slow-moving river. Consequently, research and survey projects in the region exhibit considerable variety.

In an evaluation of the 1983 trout regulations, which were developed to increase the average age and size of wild trout, biologists found that trout over 10 inches comprised only 1 percent of wild trout populations and that fish over three years old were rare. Another trout study indicated that the half-wild brown trout fingerlings (domestic female crossed with wild male) have a higher survival rate than hatchery fingerlings one year after stocking.

A walleye study was initiated to predict the quality of walleye fishing in future years. Another, on Hiwassee Reservoir, found no link between pesticides, metals, parasites or disease and the chronic walleye dieoffs observed on the lake.

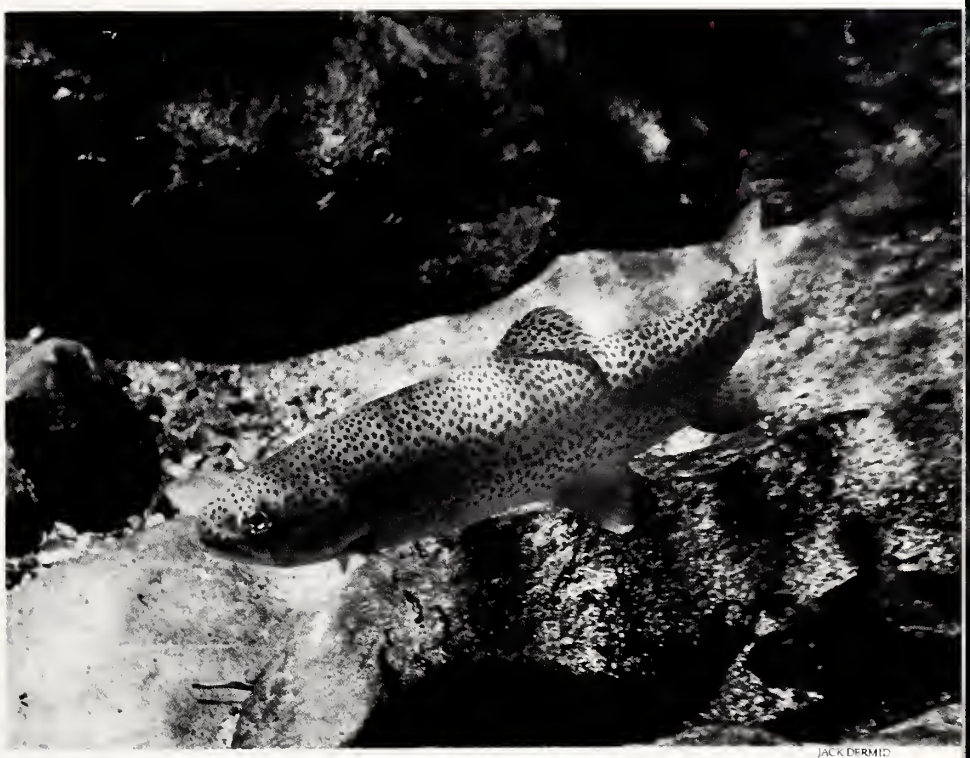
To evaluate muskie fishing in western North Carolina, fishermen kept diaries on their fishing trips, recording the date and the number of muskie caught having a fin-clip mark (all stocked muskie were so marked). The results of this study indicated that good muskie fishermen in North Carolina catch one legal-sized fish (greater than or equal to 30 inches) for every 80 hours spent fishing as compared to the national average of one muskie per 100 hours.

The spotted bass population in W. Kerr Scott Reservoir was evaluated during this biennium. This study demonstrated that spotted bass grow relatively slowly, making them less desirable as a game fish than other black basses. No future introductions of spotted bass are planned.

Creel surveys on Lake James and Fontana Reservoir were completed in cooperation with Duke Power Company and Tennessee Valley Authority. Fishing effort on Fontana was relatively light at about 6 hours/acre/year, while Lake James receives a moderately heavy effort (44 hours/acre/year). Catch rates on both lakes were similar and there was no indication of overharvest of any species.

FISHERIES MANAGEMENT PROGRAM

Three public fishing access areas were completed on Badin Lake (1) and on Falls-of-the-Neuse Lake (2). Each includes a graveled parking lot, access trails to the water, and a shoreline clear of brush. Five fishing platforms were constructed at the Con-



JACK DERMID

***A rainbow trout** hangs nearly motionless in the crystal currents of a mountain trout stream. Cold-water fisheries management is an important part of the Division's work, and includes not only propagating and stocking trout where needed, but also maintaining wild trout fisheries.*

BOATING AND INLAND FISHERIES STOCKING PROGRAM

WARMWATER FISHES STOCKED

Species	1987	1988	Total
Striped Bass	464,000	655,919	1,119,919
Bodie Bass	63,130	64,677	127,807
White Perch	37,195	58,616	95,811
Largemouth Bass	80,309	52,000	132,309
Bluegill	107,222	127,033	234,255
Redear Sunfish	98,665	78,400	177,065
Redbreast Sunfish	27,760	37,394	65,154
Sunfish Hybrid	2,784	24,156	26,940
Channel Catfish	105,074	10,800	115,874
Threadfin Shad	95,890	111,749	207,639

COOL AND COLDWATER FISHES STOCKED

Species	1987	1988	Total
Walleye	—	23,545	23,545
Muskellunge	2,750	1,213	3,963
Smallmouth Bass	8,435	—	8,435

CATCHABLE TROUT

Species	1987	1988	Total
Brook	74,411	177,394	251,805
Brown	168,675	209,026	377,701
Rainbow	257,311	291,981	549,292

FINGERLING TROUT

Species	1987	1988	Total
Brook	42,010	192,740	234,750
Brown	8,651	212,385	221,036
Rainbow	—	163,572	163,572

JANE ROHLING

***Platforms for** fishing are replaced by a development crew on this bridge across Nutbush Creek at Kerr Reservoir. Such spots offer convenient fishing for anglers who don't have access to a boat.*

federate House Access Area on Falls-of-the-Neuse Lake. A total of 4.2 miles of shoreline bank clearing have been completed on 13 lakes or rivers. A total of 51.5 river miles were cleared of instream obstructions on six blackwater rivers or creeks where public boat launching facilities are located.

Division staff worked on other habitat-enhancing projects. A total of 45 stream-improvement devices were installed in Pacolet River, and Tom's, Scott, Fowler, Curtis, and Shuler creeks. In addition to providing cover, these devices create stream meanders and pools, and increase the number of fish a stream can support. Seeding exposed shorelines in fluctuating mountain reservoirs during periods of low water increases the availability of cover for young-of-year game fish the following spring when

water levels peak. A total of 30.25 acres were seeded with reed canarygrass at several lakes and reservoirs. Also, a total of 202 trees were cut-and-cabled and 240 fish attractors—constructed of automobile tires, discarded Christmas trees, or PVC—were placed on 21 lakes or reservoirs.

FISH PRODUCTION PROGRAM

Striped bass and Bodie bass (striped bass x white bass hybrids) were stocked in many reservoirs across the state to maintain additional sportfishing opportunities. Broodstock for striped bass and Bodie bass production were obtained from the Dan and Roanoke rivers and transported to the Commission's spawning facility at Weldon. Approximately 4.5 million striped bass fry were produced in 1987 and 3.6 million were produced in 1988. Approximately 2.1 million Bodie bass fry were produced in 1987 and 1.7 million were produced in 1988. In addition, 17,000 Bodie bass fingerlings were obtained from private sources in 1988.

A total of 464,000 striped bass fingerlings were stocked in 1987 and 656,000 were stocked in 1988. The 13 reservoirs receiving striped bass fingerlings include: Rhodhiss, Hickory, Lookout Shoals, Norman, Mountain Island, High Rock, Tuckertown, Badin, Tillery, Blewett Falls, Gaston, Roanoke Rapids, and Falls-of-the-Neuse. Approximately 63,000 Bodie bass fingerlings were stocked into North Carolina waters in 1987 and 65,000 were stocked in 1988. Waters receiving Bodie bass include: Jordan, Thom-a-lex, Oak Hollow, Moss and Salem lakes.

During the biennium, a total of 207,639 threadfin shad were stocked in many of the state's reservoirs to supplement the food supply of game fish. Adult threadfin shad were collected from the tailrace of Mountain Island Reservoir and transported to selected reservoirs.

In the mountains, the emphasis in fish production is on trout. The Wildlife Resources Commission operates three trout hatcheries to produce fish for the catchable-trout program. This program provides additional angling opportunities in areas which normally support limited trout populations, and complements the state's 400 miles of wild-trout waters. During the biennium, an average of 589,399 catchable trout were stocked each year in over 1,000 miles of streams and 1,100 acres of lakes and ponds. Despite the severe drought conditions of 1986-1988, the quality of trout produced in our hatcheries remained high. Over 619,000 fingerling trout were stocked in streams where wild trout reproduction is poor. Fingerling trout stockings can provide a boost to wild trout populations in areas of high quality habitat, and sometimes determine the difference between marginal and superior trout fisheries.

Coolwater fish production also plays an important role in the agency's fishery management programs. Walleye fingerling production was enhanced by the acquisition of an additional strain of walleye from Minnesota. Two strains of muskellunge were produced to supplement established muskie populations in western lakes and rivers and smallmouth bass stockings were initiated to re-establish a decimated population.

JANE ROHLING

***Is it really** true that most of the lunkers are caught by kids, or does it only seem that way? This whopper largemouth is proudly displayed by this pair of youngsters, proving at least that the big ones are out there if you're a good fisherman—and lucky.*

CONSERVATION EDUCATION

A love of North Carolina's outdoors and the myriad wildlife species that live here is shared by most of us, and the future of these natural resources lies largely in the stewardship of concerned and educated citizens. Providing the information and education to nurture that stewardship is the goal of the Division of Conservation Education.

To try to reach that goal, the Division attempts to educate and inform through publications, exhibits, movies, television, radio, newspapers, conservation education workshops in our schools, and through youth programs. Three sections within the division —Publications, Audio-Visual, and Field—work in these various areas.

KEN TAYLOR

***Melissa McGaw**, one of the staff photographers in the Conservation Education Division, maneuvers her long lens for a recent early morning shoot. Photographers annually produce thousands of slides and black and white prints for use in* Wildlife in North Carolina *magazine and other Wildlife Commission publications.*

PUBLICATIONS SECTION

With over 76,000 paid subscribers, *Wildlife In North Carolina* magazine is the most visible product of the section. Over the years, this colorful monthly has been a favorite of sportsmen, teachers, students and families, and has won many awards for writing, layout and photography. During the biennium, the magazine celebrated its 50th anniversary with a special issue of the magazine published November 1987. As part of this celebration, the Publications Section of the Conservation Education Division also collaborated with The University Of North Carolina Press to publish a book—also titled *Wildlife In North Carolina*. It features articles, photographs and artwork that have appeared in the magazine throughout its history, and it has been a popular seller.

Yet, while the magazine is the most visible product of the section's three editors, three graphics designers, typesetter, and special projects and promotions coordinator, it actually accounts for only about a third of the total output of this section. During the biennium, the section completed over 400 special projects and other publications. Among these were brochures on the black bear, beavers, bass, wildlife on farms, Conine Island and other smaller publications. Other projects ranged from the annual wildlife calendar, a Project WILD coloring book and nongame wildlife posters to the quarterly *CATCH* (Carolina Anglers Teach Children How) *Newsletter* and *Carolina Notebook* (published eight times a year). Publication of the annual hunting, fishing and trapping regulations digest is a major annual project. Many smaller projects during the biennium involved material for displays, logo designs, special workshops and programs, form revisions, reports and a variety of other routine publication needs for the agency.

The special projects and promotions coordinator within the section covers a variety of functions related to the production of these publications, but also handles many other projects for the agency. The planning and coordinating of inhouse renewal forms, subscription blanks, and promotion of the magazine are part of this work. Also included are planning and/or coordination and promotional efforts for the Wildlife Endowment Fund, Wildlife Month, sportsman's print program, calendar, State Fair, Dixie Deer Classic, traveling waterfowl exhibit and other similar displays and special projects.

AUDIO-VISUAL SECTION

Wildlife photography, the production of television public service announcements and motion pictures, photo processing and printing—these are just a few of the many tasks performed by the Audio-Visual Section.

One of the most appealing features of *Wildlife In North Carolina* magazine is its excellent photography. A major percentage of these photos, both color and black and white, were shot by section photographers over the past biennium. In addition, staff photographers produced photos for news releases, special publications, slide shows, exhibits and other projects. A strong photo developing and printing unit helps achieve these objectives by processing film and prints on time.

During the past biennium, work demands on the section have increased dramatically due to greater emphasis on staff-produced photos, particularly for use in the magazine. This approach has worked toward reducing magazine production costs while increasing the quality of photography. Photographic output has also increased due to increased requests for assistance from other divisions within the Wildlife Commission.

Another priority project, a 30-minute film featuring the Wildlife Commission's freshwater fisheries management program, is scheduled to be completed in the spring of 1989. The film will be available to the public on a free loan basis from local libraries throughout the state.

The motion picture portion of the section's audio-visual library was transferred to the film section of the N.C. Division of Cultural Resources in order to improve distribution of the films. The state film

***Urban children** often get their first fishing experience through clinics offered by the CATCH (Carolina Anglers Teach Children How) Program. Kim Garner, program coordinator, demonstrates correct casting procedures at a recent CATCH clinic.*

JANE ROHLING

CONSERVATION EDUCATION

***Children learn** important ecological concepts while playing an enjoyable game. This game and others are part of Project WILD, the Commission's environmental education program for teachers. The educational field staff conducted 292 programs for students and teachers during the biennium.*

RALEIGH NEWS AND OBSERVER

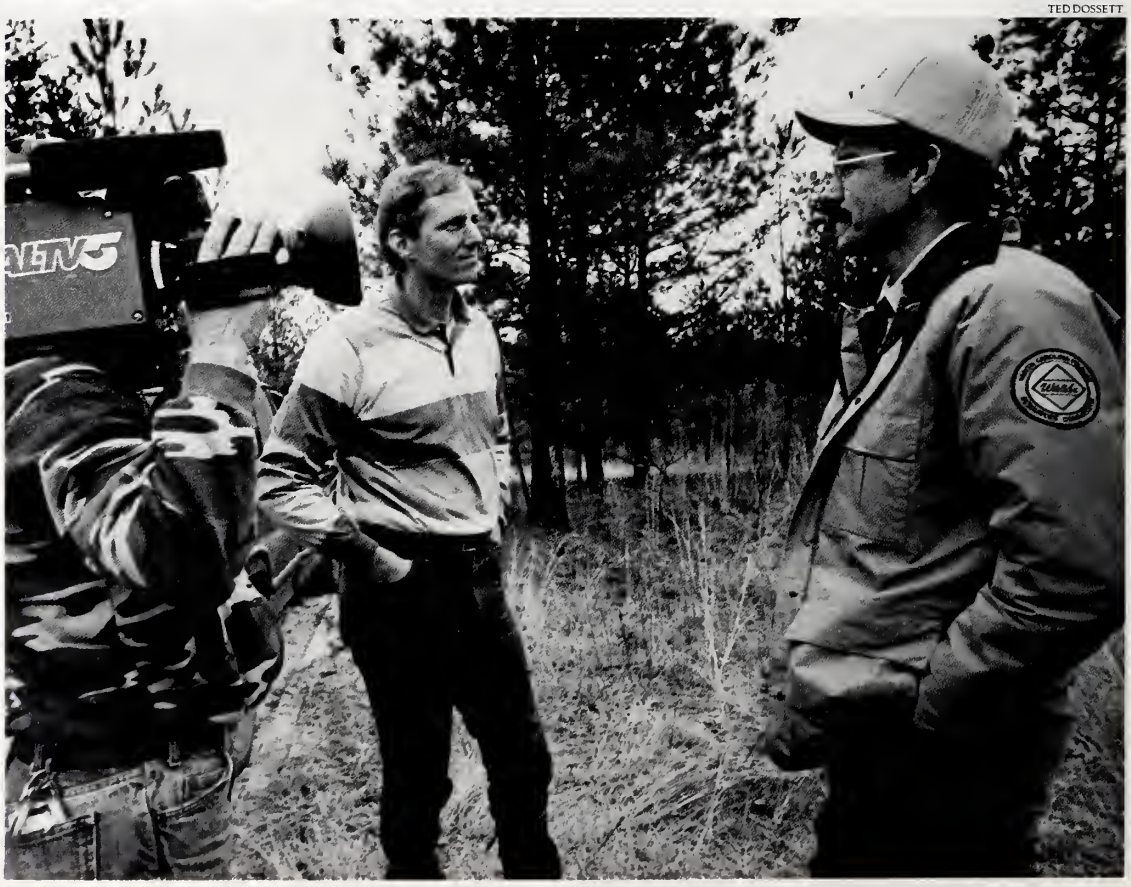
library distributes films to local libraries across the state thus all the films transferred from the section's library will still be available. Furthermore, since the state film library is much larger, borrowers will have a wider selection of film titles to choose from.

The demand for new photos is a never-ending process and the photo files maintained by the section have now increased to over 80,000 color and black and white images. This also means that section personnel have spent considerable time recording and filing slides as well as pulling photos for use in publications and audiovisual productions.

FIELD SECTION AND NEWS PROGRAM

Providing accurate wildlife and environmental educational services to students and teachers produces important long-term benefits to the state, and is one of the most critical functions of the Division of Conservation Education's field section. Providing local information about programs and services of the N.C. Wildlife Resources Commission is a second important role played by the

TED DOSSETT



***Sportscaster Bob** Holiday of Raleigh TV station WRAL interviews small-game biologist Terry Sharpe at an Ellerbe quail hunt. The news director and education field staff coordinate similar media attention for important Commission-related stories.*

field section in coordination with the agency news director.

The field staff conducted 292 programs for students or other groups that reached 22,377 individuals. During the biennium, the series of Project WILD and CLASS Project teacher workshops gained popularity and more than 150 workshops reached approximately 3,000 adult educators. These workshops are designed to teach educators not only a valid understanding of natural ecology and wildlife dynamics, but show effective methods to impart this knowledge to students.

During the biennium, despite several key personnel changes, field staffers stationed across the state and the news director prepared and mailed 495 news releases to media outlets. Of these, 241 were local releases, 120 were regional releases, and 134 were statewide releases.

Operating as an overall coordinator of the news program, the news director worked on a daily basis with media across the state, and prepared 143 statewide releases out of the Raleigh office. The news director also prepared the bimonthly Wildlife Newsletter until it was discontinued in favor of individual releases.

Working closely with television and radio stations, the section arranged many interviews with biologists and other members of the Wildlife Commission staff to give publicity to various projects. A weekly radio program prepared by the section and news director was aired on an average of 141 radio stations weekly during the biennium.

Displays were prepared for various local fairs, outdoor shows and other similar functions across the state, and more than 40 such displays reached over half a million visitors during the biennium.

Two youth programs continued to be successful during the biennium. More than 40 CATCH Clinics were held across the state during the warmer months, and with agency and volunteer help have proven very popular with youngsters. Many of the kids who attend these clinics have never fished before, and they are introduced not only to the pleasures of fishing, but also receive a short course in safety and aquatic biology. Youth hunts are held during the fall and winter months, and are similar in purpose to the CATCH Clinics.

The field and news staff also assist in preparing publications, including *Carolina Notebook* (a guide for teachers), *CATCH Newsletter*, and articles for the agency magazine, *Wildlife In North Carolina*.

THE WILD BUNCH

Jay Davies is happiest when he's ankle deep in a mountain stream poking under rocks looking for crayfish and aquatic insects. He's not usually alone on these trips, however. He likes it best when he has a group of teachers with him.

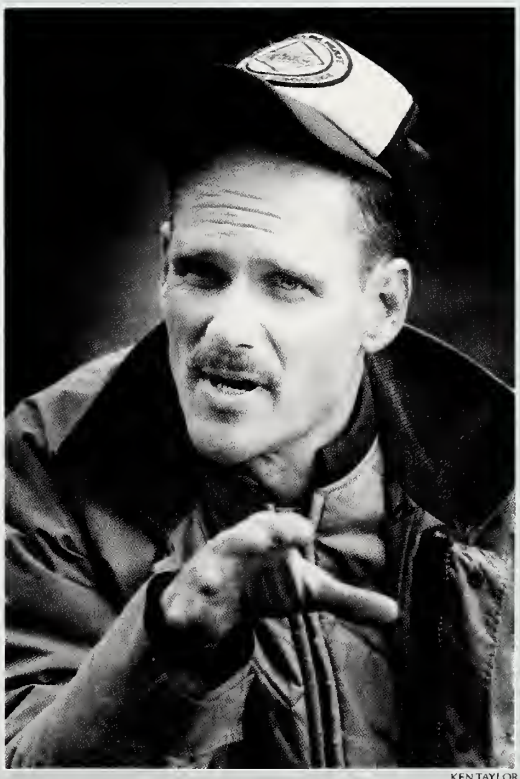
Davies lives in Sylva, and is mountain region supervisor for the Division of Conservation Education. Much of his work involves introducing teachers and leaders of youth groups to aquatic and conservation education through Project WILD, the Wildlife Commission's environmental education program.

"The outdoors is a great place for adults and kids to learn," he said. "That's one reason I like Project WILD so much — its activities are so well-designed that teachers can easily incorporate natural history, wildlife management and conservation issues into any subject area at any grade level. I've seen the same activity used with kindergarten classes and college students, and everyone learned from it."

Davies is especially excited about the development of a new supplement of aquatic activities to Project WILD.

"Preserving and improving water quality is certainly one of the most important issues facing us today, and the best way to get people concerned about water quality is to get them out on the water. There's nothing like taking a class out stream sampling — you literally have to drag the kids out of the water at the end of the day."

In addition to its value as a purely educational tool, Davies adds that Project WILD helps build an awareness and appreciation for our natural world. "If we're going to preserve our natural resources in the future, we need concerned citizens. Project WILD activities help make students more aware of how their decisions affect wildlife."



KEN TAYLOR

Jay Davies

"If we're going to preserve our natural resources in the future, we need concerned citizens."

ADMINISTRATIVE SERVICES

Quality administrative support for all activities of the Wildlife Resources Commission is provided by the Division of Administrative Services. Major responsibilities include handling all fiscal transactions, processing all data, and collecting all monies due. The Division is also responsible for monitoring transactions to ensure that they are appropriate and that they comply with laws, rules and regulations for preparing reports for use in management decisions, and maintaining records of every transaction for statistical and audit purposes.

To do this, sections within the Division of Administrative Services are responsible for specific areas of work.

FINANCIAL MANAGEMENT

This section handles each agency transaction involving revenues or expenditures, including reporting, accounting for, and maintaining records. During the biennium, 22,883 checks were written for expenditures totaling $42.0 million. Revenues collected into the operating fund totaled $40.8 million, and Endowment Fund revenues were $9.7 million.

SUMMARY OF OPERATIONS

	1986-87	1987-88
Cash Balance Carried Forward		
From Preceding Year	$3,927,793.95	$3,240,796.28
Net Receipts for Year	19,859,294.30	20,990,309.58
Total Available Funds	$23,787,088.25	$24,231,105.86
Less Expenditures	$20,546,291.97	$21,457,272.44
Cash Balance June 30, 1987	3,240,796.28	
Cash Balance June 30, 1988		$2,773,833.42

Expenditures—July 1, 1986-June 30, 1988

	1986-87	1987-88
Administration		
Administration, Policy & Regulations	$535,934.81	$557,608.68
Administrative Services		
Financial Management	361,137.51	419,398.51
Revenue Management	626,522.45	795,167.38
Data Processing	460,517.37	470,320.71
Enforcement	8,006,233.52	8,555,040.68
Hunter/Boater Safety	544,511.79	618,860.49
Conservation Education	1,542,778.55	1,569,990.28
Inland Fisheries	2,274,560.32	2,848,521.82
Construction & Maintenance	946,464.04	764,965.41
Wildlife Management	3,909,185.61	4,431,095.92
Nongame & Endangered Species	309,937.36	356,244.94
Reserves and Transfers	1,028,508.64	70,057.62
TOTAL EXPENDITURES	**$20,546,291.97**	**$21,457,272.44**

The agency's supply stockroom and warehouse are managed and operated by this section. This enabled the agency to purchase in bulk—at savings—items ranging from pencils to boat covers and uniforms, and distribute them as needed. During the biennium, the stockroom and warehouse personnel handled 3,656 supply requisitions.

Every purchase of an item used by the Wildlife Resources Commission was either monitored or handled entirely by this section to ensure compliance with laws, rules and regulations. During the biennium, this section processed an estimated 2,588 purchase orders totaling $5.8 million.

This section also provides mailroom services for the agency. During the biennium, postage expenditures increased by 27.8 percent to $550,423. This represented an increase in number of items mailed from 1.7 million during the previous biennium, to over 2 million, plus some 19,000 items of freight shipped at a cost of $40,771.

REVENUE MANAGEMENT

License Sales

The License Section is responsible for the sales of hunting and fishing licenses, the collection and deposit of revenues from these sales, and the maintenance of records to account for each license. This section, with the help of 960 agents statewide, sold 1.4 million licenses netting $21.3 million in revenues to the agency during the biennium or 52.2 percent of the agency's operating revenues during that period. The License Section also sold 28,896 Endowment Lifetime licenses which brought in $4.7 million in revenues. These revenues, plus the interest earned, increased the Endowment Fund balance from $5.8 million to $14.9 million at June 30, 1988.

A big accomplishment was made in handling license sales and revenues during the biennium when on-line computer programs were completed for agent accounts and endowment lifetime licenses. This enables faster handling of the items, the ability to report information sooner, and the capability for one-time reviewing, monitoring and analyzing information during the interim between entry and reporting.

Boat Registration

All boats in North Carolina with motors, and sail boats 14 feet and over at load water line, are required to be registered. This section registers these boats,

Fishing, hunting *and trapping licenses are sold at numerous stores, sporting goods shops and other retail outlets throughout the state, making them readily available to sportsmen.*

and with the help of 221 agents statewide renews the registrations upon expiration. As of June 30, 1988, there were 244,667 boats registered in North Carolina, an increase of 24,054 during the biennium.

It is the boat owner's option to register the boat for either one year or three years, with renewal at the end of that time. More than 100,000 registrations were renewed annually.

This section must handle renewals on time, which presents a challenge during warm-weather months, the period when most boat owners want to use their boat and the period when most boat registrations expire. With temporary help during the summer months, this section is able to deposit monies received daily and process registration and renewals within two weeks.

During the past several years the Wildlife Resources Commission has implemented a stamp and print program. Artwork is selected annually to be used on the waterfowl and sportsman license

LAWRENCE S. EARLEY

***Accounting clerks** Joan M. McKeel (foreground), Carmen Ryals (left) and Judy Jones are part of the Division's revenue management team that processes license sales.*

ENDOWMENT FUND	Interest	Principal
1986-86	$644,850.92	$6,019,825.14
1987-88	1,271,754.79	1,747,431.54
TOTAL	$1,916,605.71	$7,767,256.68

Revenues—July 1, 1986-June 30, 1988

	1986-87	1987-88
Hunting and Fishing Licenses	$10,018,155.64	$11,774,208.15
Bonding—Agents	13,625.00	15,344.00
Motorboat Registration	1,161,700.05	1,343,235.45
Federal Cooperation	3,314,343.44	3,727,606.12
Management Area Receipts	399,256.74	372,027.06
Gasoline Fuel Tax	484,016.29	583,768.43
Transfer From NRCD	100,000.00	50,000.00
Transfer from Dept. Revenue—Nongame	322,906.34	381,014.93
Transfer from Dept. Revenue—Sales Tax	2,155,409.00	1,960,000.00
Transfer from Endowment Fund—Interest	520,911.00	8,128.68
Transfer from Capital Improvement	150,000.00	16,124.07
Sale of Publications	303,555.22	305,582.14
Waterfowl Print Royalty	121,698.50	94,113.50
Sportsman Prints & Stamps	.00	5,700.00
Contribution from DU, Marsh Funds for Conine Island Purchase	215,000.00	.00
Sales—Calendars—Stamps	55,381.37	56,634.64
Sale of Prints	19,951.73	3,427.25
Sale of Surplus Property	125,861.11	110,193.27
Rental of State Property	7,525.00	12,236.10
Replacement Costs of Wildlife Resources	27,055.50	38,473.30
Personalization Fees	19,440.00	17,615.00
Cherokee Indian Reseravations—Trout	12,524.95	.00
USGA Land—Goose Creek	152,000.00	.00
Creel Survey	.00	5,200.00
Fees, Licenses and Fines	46,641.60	41,152.24
Sales—Endowment Items	4,422.00	4,058.75
Sales of Conservation Items	4,354.72	3,955.91
Donations	11,163.64	11,543.16
Miscellaneous	92,395.46	48,967.43
TOTAL REVENUES	**$19,859,294.30**	**$20,990,309.58**

stamps, and prints are also produced from this artwork. This section handled the sale of prints and stamps through art dealers who sell them to collectors. Sales of subscriptions to *Wildlife in North Carolina* are also handled by this section.

Data Processing

The Data Processing Section is a support branch of the Wildlife Resources Commission. Each month, many hours of manpower are devoted to each division to assist and improve their overall ability for managing their assigned programs. Major accomplishments during the biennium included routine work and improved programs as described below.

Routine work required a vast amount of time and resources during the biennium. Such work includes processing all subscriptions to *Wildlife in North Carolina* magazine, enforcement activities and prosecutions, and motorboat registrations. Departmental accounting, federal aid accounting and hunting and fishing license accounting are also handled by the section. As the volume of these functions increases, so do the demands for manpower and the overall computer capabilities of the Data Processing Section.

During the biennium, the processing of the Wildlife Endowment Fund Lifetime License Program was converted to an "on-line" program with several improvements over the old method. The new system enables us to emboss a plastic card for lifetime licenses while processing the customer's application. With this new program, master files are updated on-line, retrieval of license data is almost immediate, and the overall management of the entire system is greatly enhanced.

The Commission data-processing staff worked closely with the Division of Wildlife Management before and during each of the past two hunting seasons. Through these coordinated efforts, the Data Processing Section processed data from either-sex deer hunt applications, swan hunts, fur records, big-game harvest records, wildlife cooperator agents and other information in a timely manner, essential to the Division's completion of several major projects.

The CATCH program was converted to the mainframe computer to provide the Division of Conservation Education with information about renewals, the printing of certificates and identification cards, and master files. ⊠

THE PROBLEM SOLVER

Ruby Krockman's day really begins when the mail arrives each morning at the Boating Registration Section's offices in Raleigh. She sorts through the hefty stack, extracting problems the way Little Jack Horner pulled out plums from his famous pie. A sample: "I've lost my boat registration. What do I do?" "My boat registration expired. How do I get a new one?"

Krockman is the problem solver for the section. "I research problems on a computer. To me it's a challenge to get a real problem, research it until I can figure out what to do, and then correct it."

For the North Carolina boating public, Krockman and the other staff in the Boating Section are the Wildlife Commission's front line. They help and advise boaters and sometimes even calm them down. "People don't understand how long it takes to get a registration processed, especially once warm weather arrives and everyone is eager to get his boat in the water," she says. "One gentleman was very rude, but I was able to keep calm and help him out and do you know that man called me four times to apologize? Another boater sent up a basket of fruit and candy after I helped him."

Krockman's job has intensified since she began with the Commission in 1971. In that year boat registrations totaled only 82,983. But by September 30, 1988, boat registrations for the year had leapt to 253,652.

"We're busiest around the first of March through Labor Day," she says. "At one time, boat registration would just cut off after Labor Day, but now it seems to go on year round. It really is hectic. We have four telephone lines coming in to the office and we're dealing with boat owners all the time."

It gives Krockman a good feeling to know that she's helped people out. "I enjoy it. I'm dealing with people and I have a nice group of people to work with. That makes all the difference."

KEN TAYLOR

Ruby Krockman

"One boater sent up a basket of fruit and candy after I helped him."

PERSONNEL SERVICES

All matters that have to do with the 479 men and women employed by the Wildlife Resources Commission are the responsibility of the Personnel Section. These responsibilities include recruitment, affirmative action, administration of the pay plan, employee relations, maintenance of the health-insurance program and other employee benefits, and a variety of other duties.

During the biennium, these responsibilities have been augmented by the provisions of several laws affecting employees and prospective employees of the Wildlife Commission. One is the U.S. Supreme Court ruling that state and local governments are subject to the Fair Labor Standards Act, which declares that employees are subject to overtime. Another, the Immigration Reform and Control Act of 1986, imposes civil and criminal penalties on people or entities that hire unauthorized aliens.

In the past two years, an affirmative-action coordinator was appointed from each division to assist in updating the affirmative-action plan each year. The Personnel Section is in charge of maintaining the provisions of this act, and it also administers the provisions of North Carolina's new Disability Income Plan. This plan provides equitable replacement income for eligible employees who are disabled and cannot work.

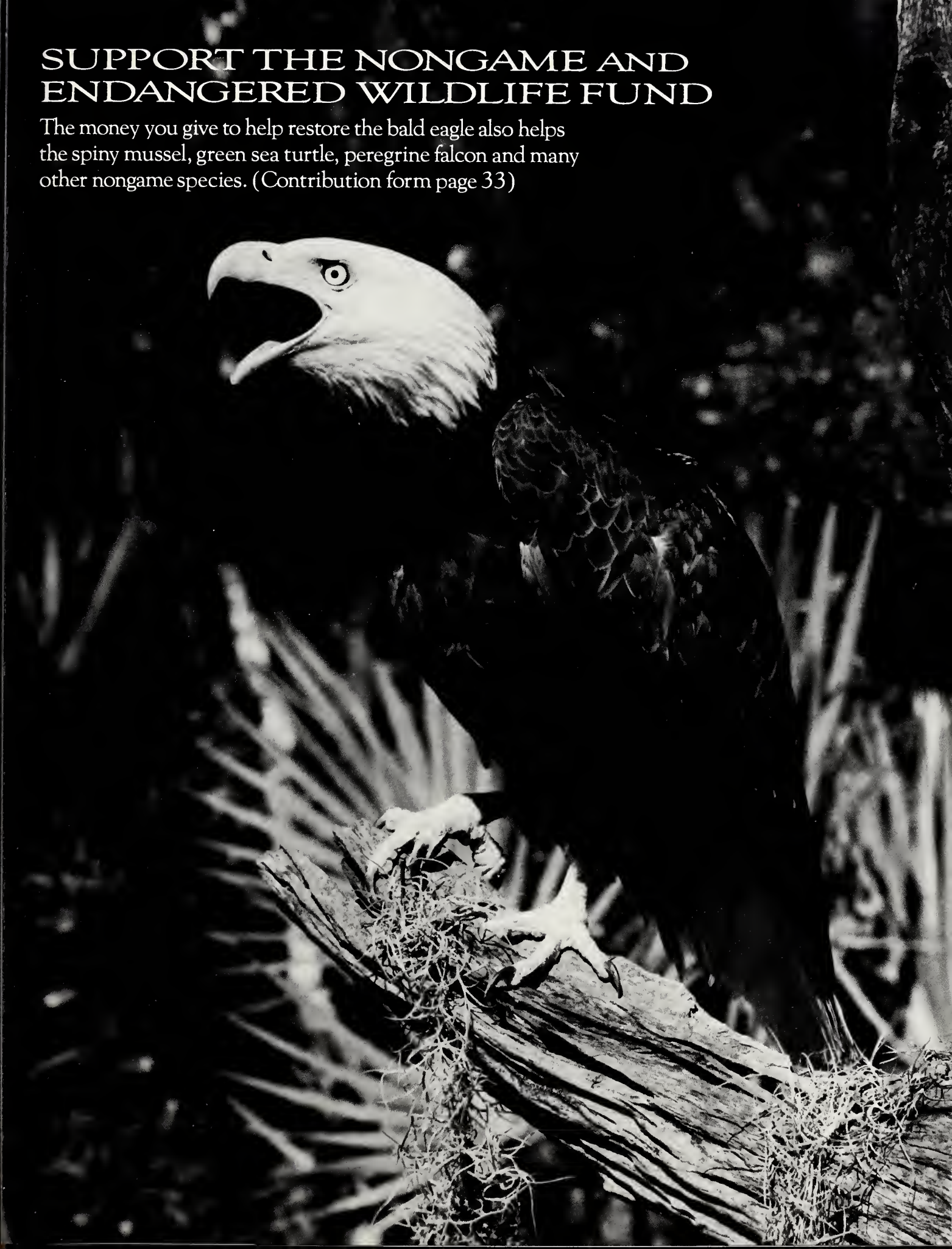
This section, like other parts of the Wildlife Commission, is rapidly becoming automated through the use of microcomputers. All of its personnel records will soon be transferred to microcomputer for ease of access and manipulation of data.

KEN TAYLOR

***The Personnel** Division performs a variety of services for the 479 personnel who work for the agency. Corinne Schoephoerster handles payroll data, insurance benefits and orientation of new employees as part of her duties with the Division.*

SUPPORT THE NONGAME AND ENDANGERED WILDLIFE FUND

The money you give to help restore the bald eagle also helps the spiny mussel, green sea turtle, peregrine falcon and many other nongame species. (Contribution form page 33)



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WILDLIFE IN NORTH CAROLINA

FEBRUARY, 1989 75 CENTS

The Beast Within

by Jim Dean

Perhaps it seems insignificant in the larger scheme of things, but most of us can recall the first time we drank water from a spring or clear creek. There was something pure in that simple act, something wild and forbidden that linked us with pristine frontiers.

I dimly recall early quail hunting trips with my father and grandfather near Medoc in Halifax County. An old spring was one of our stops, and I was impressed by the fact that someone had left a long-handled dipper hanging on a peg driven into a tree beside the spring. Taking care not to disturb the leaves, we'd each take turns slaking our thirst.

JIM DEAN

Until about 1980, I also took some small pleasure in drinking out of the trout streams I fished. I guess part of it was believing it was still possible to get into country remote enough to retain such purity. I didn't know how wrong I was until one of my friends came down with hepatitus, apparently from drinking out of one of my favorite streams. About the same time, another friend had a very unpleasant encounter with a parasite known as *Giardia lamblia*.

If you do much rambling in the outdoors, you have surely heard of Giardia, an intestinal parasite that can cause intense stomach aches, diarrhea, fever and loss of energy that may recur for weeks or months. Since this parasite can be carried and passed not only by humans, but also dogs, livestock and wildlife, it can be found in surface water even in the most remote areas.

My first reaction upon learning about this parasite was probably typical. I believed the danger of contracting Giardia by drinking from creeks was a recent threat. The truth is, however, that *Giardia lamblia* has been with us all along. Indeed, early explorers called its effects "beaver fever."

A second belief was equally wrong—that Giardia was largely confined to the far West and Northeast, and had yet to become widespread in the Southeast.

"It is prevalent worldwide, and is certainly common in North Carolina," explains George Robertson, state parasitologist. "Almost everyone gets it at one time or another, especially during childhood. Fortunately, most of us tend to develop some immunity to it after we reach the age of 10 or 12, but when adults get it, some of them seem to suffer more, and I suspect it's because we have contracted a particularly virulent strain for which we have little immunity.

"Giardia is but one of the many illnesses that cause this kind of distress, of course," said Robertson. "I suspect the reason so many people believe it's more prevalent in the western part of the country—Colorado and Arizona, for example—is because pure water is in shorter supply there, and surface water has been more often used as drinking water. This may have led to more testing for Giardia there, and more publicity about it. Throughout the country, however, the increase in human and animal population has apparently made it a more likely contaminant, thus increasing our chances of contracting it."

Robertson also points out that Giardia is frequently passed on in the home. "We may not like to think of it this way, but it's transmitted quite literally by hand to mouth, and some people can be carriers all their lives without actually experiencing unpleasant symptoms themselves. It simply underscores the need for exceptional care in cleanliness."

For outdoorsmen, however, there are two ways to avoid contracting Giardia. The first step is to avoid drinking surface water. "In my experience, ground water is free of Giardia," said Robertson. "We haven't found it in wells, for example, nor is it necessarily unsafe to drink from a spring since that water is ground water, not surface water. However, most people who think they are drinking from a spring are not actually drinking from the spring where it flows out of the ground. Instead, they may be drinking water that has flowed along the surface under leaf litter for hundreds of yards. It's also possible that the spring catch basin could have been contaminated by a wild animal, so it may not be worth the risk."

If you don't carry water from home, or that is impractical, what safety precautions can you take? Boiling water for five minutes will kill Giardia, and chemical disinfectants available over the counter are effective if you follow directions closely. Also, five drops of iodine added to a liter of clear water for 30 minutes is effective. Portable water filtration systems also work, but are a bit less reliable because they may become partially clogged and not trap all the parasites. Furthermore, filters do not trap viruses.

Finally, if you ever contract what you think may be a case of beaver fever, and you suspect you got it on one of your trips, mention that possibility to your doctor. He'll no doubt be checking for parasites anyway even if he suspects something else. But if you've been drinking out of a roadside ditch, it'll give him a clue.

The good news—indeed, perhaps the only good news—is that Giardia can be treated. Bon appetit.

February, 1989
Volume 53, Number 2

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and Community Development

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *Rime coats a wind-twisted tree in a high mountain meadow. Photograph by Eddie Nickens.*

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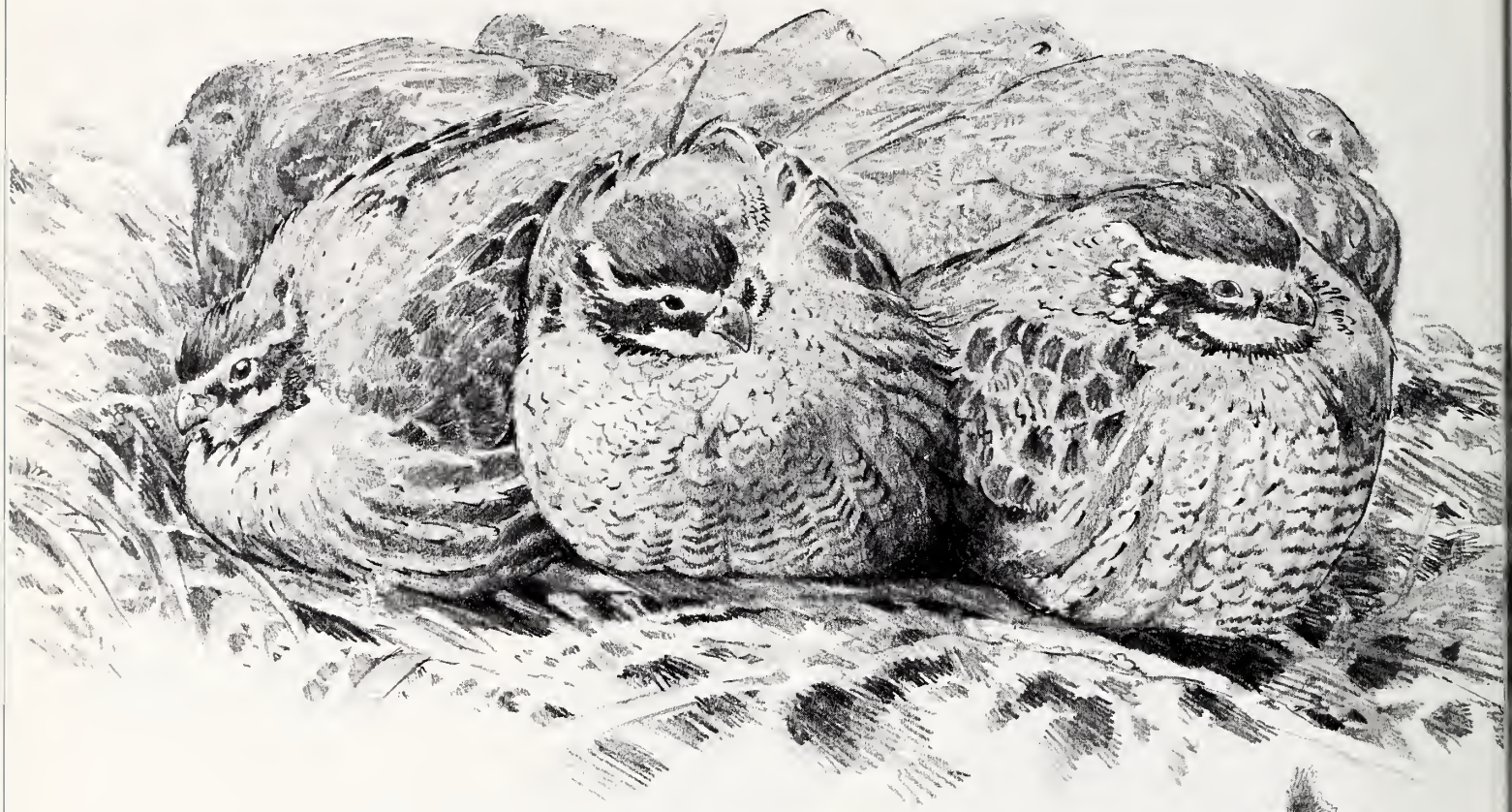
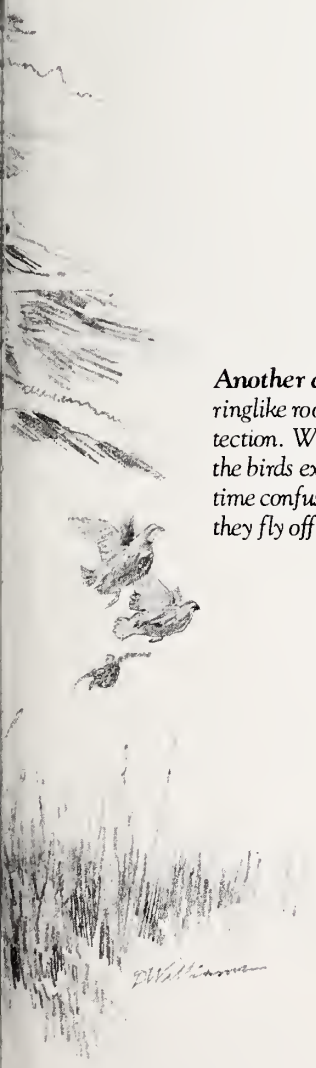


In the fall *and winter, quail feed together in coveys of about 12 to 15, establishing a range where the birds can find food and shelter. At winter's end, there is less food and quail must spend more time searching.*

Covey Season

written by Lawrence S. Earley / illustrated by David Williams

***Without the** winter roosting formation, quail would die of cold. Quail have fewer feathers than other birds and the feathers are spaced farther apart. Snow can sift between feathers and melt near the body, sometimes freezing there and killing the bird.*



***Another advantage** of the quail's ringlike roosting formation is protection. When a predator approaches, the birds explode from their roost, oftentime confusing the would-be predator as they fly off in different directions.*

The bobwhite quail has the briefest of life spans and is seemingly immune to nothing. Snow and ice can kill quail, of course, but rain, drought and heat will also kill them and so will predators and lots of other things. The average life expectancy of a wild bobwhite is perhaps 10 months, and as much as 80 percent of the population will die this or any year. That any of them survive at all to reproduce is little short of amazing and is at least partly due to their instinct to covey.

A covey is a small flock of quail — normally about 12 to 15 — that feeds together by day and roosts together by night. It consists of both males and females, young and old, and is often a family unit. The instinct to covey among quails is related to the avian instinct to flock and is apparently an inherited one, offering many advantages — help in finding food in winter, escaping predators and keeping warm.

Indeed, coveys are a mostly winter phenomenon. In spring and summer, quail pair up for the rituals of nesting and reproduction but in the fall, as the days grow cold, they engage in what is known as "the fall shuffle." Groups of 30 or more move restlessly from place to place for miles. The large groups dwindle as the winter comes on and smaller groups, or coveys, form.

A covey feeds in a well-marked range. Early in winter, when food is more abundant, the birds will eat early and then rest until the end of the day when they'll feed again. But in February and in early March, as their food grows scarcer, quail may hunt for food nearly all day to find enough to keep themselves alive.

Winter challenges the covey in many ways. Northern winters especially are harsh and many quail die of cold and starvation. In the South, however, more quail die of drought and other *summer*-related ailments than of winter's miseries. Still, winter is a time of stress and coveying instincts have evolved to help quail get through it.

One essential feature of covey life is the communal roost. The birds sleep together in a tight formation that's part circling wagon train and part glorious pile up. The formation is a circle but without the doughnut hole in the middle. Some biologists prefer to call it a roosting "ring" or "disk," and they emphasize its solid appearance. The quail point their tails inside, toward the center, their heads to the outside, and they overlap their wings. The body heat shared in this way can help them survive almost the coldest of nights. The colder the day, the more closely packed the ring. You can always tell where quail have been roosting by the pile of droppings left behind.

To enjoy the full benefits of the formation, coveys have to be a certain minimum size. With fewer than six members, coveys will be unable to generate the heat needed to survive a cold night. Quail from a small covey may join up with another covey, or individuals may replace members that have died or been killed. Thus, hunters may shoot several birds from the same covey on several occasions without seeing any diminishment of the size of the covey.

By the end of February, as the first warm days begin to signal the end of winter, nesting instincts are awakening. Some birds begin to pair off in preparation for the season ahead. They feed together during the day but may return to the roost at night. Eventually the covey loses pairs until by the end of April it has dissolved for good.

Looking Glass Falls In Winter.

ICE CAPADES

The winter woods are lovely, dark and deep. Also cold and sometimes dangerous. Campers who combine a sense of humor with common sense will find good reasons to be there.

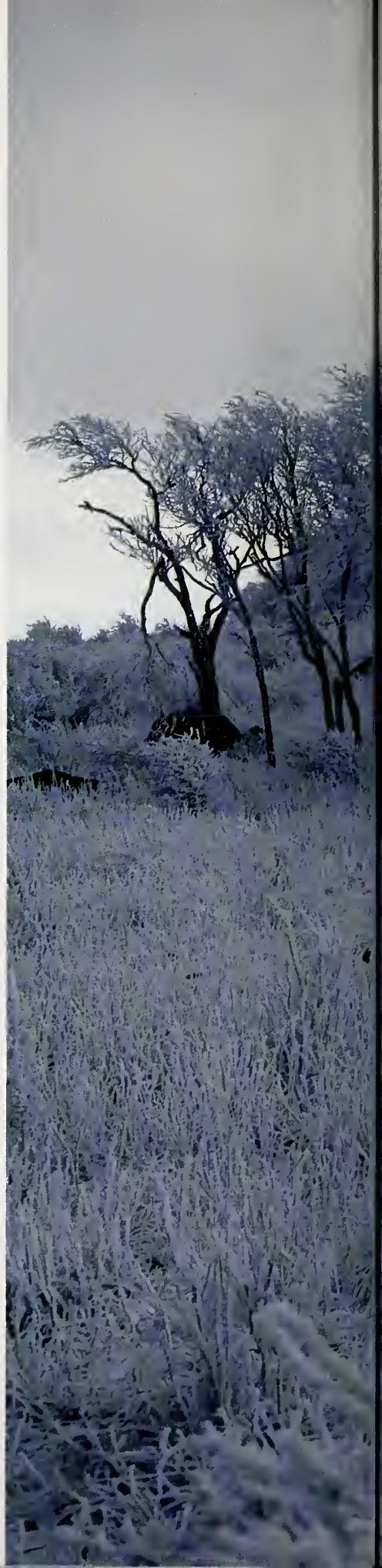
Written and Photographed by Eddie Nickens

The sport of winter camping gets about as much coverage as sky divers who jump using a sandwich baggie as a chute. Flip through the outdoor magazines between Christmas and spring thaw. You'll see articles entitled "Tackle Box Organization: How Much Is Enough?" and "Tying Your 500th Wulff: Is It Spring Yet?" But nary a single treatis on how actually to enjoy the outdoors in such weather.

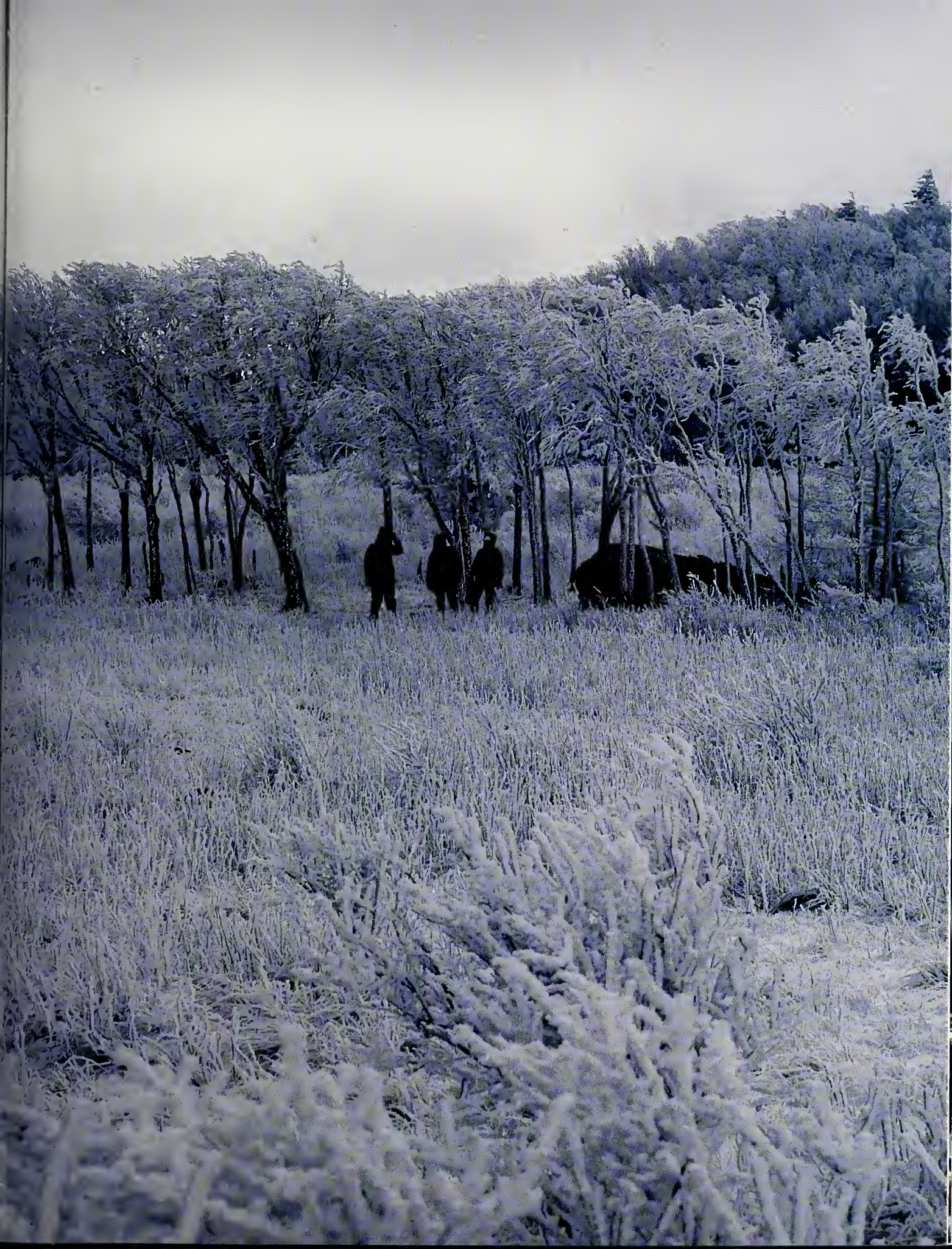
The reason is, of course, that few folks would think to spend a night outdoors in mid-winter. Try planning a camping trip in the clutches of the fourth season and see what kind of response you get. Your friends will whisper in the hall behind you. And your mother will call "just to check on you." You'll know then that the word is out. You're crazy, pal. *Crazy*. You're going camping in this kind of weather?

There are, of course, some good reasons for this madness. There's the beauty and the solitude of the winter woods, a frozen desolation that's as much a part of the natural world as the verdant spring. Better than that, you don't have to share it with anyone.

It takes more than a bottomed-out thermometer to keep the serious outdoorsman inside, regardless of the weather forecast, but veteran winter campers know it takes planning for the worst-case scenario. They know to travel in groups, not only because misery loves company, but for safety. Winter camping is a bigger challenge not because the chances for misfortune are greater, but because the chances for any hard luck to turn into tragedy are increased. Thus forewarned, a winter camping trip should resemble little more than the Ice Capades in hiking boots, right?



***Campers, dazzled** by the glory of a world glazed in ice, stand in a frozen copse of woods near Mt. Rogers in Virginia.*



***At times like** this, it takes a hardy soul to appreciate the pleasures of winter camping. Tomorrow, the trail will lead to Shining Rock, but that pup tent looks none too inviting for the night ahead.*

Ah, but if only it worked out so easily. Winter campers must keep in mind the basic necessities of winter camping, which are loosely based on the basic necessities of life: Junk food, unfrozen water and enough clothes to make the skinniest camper look like a multi-colored Michelin Man. And just as there are laws governing almost any aspect of civilized life, there are laws covering proper etiquette of winter camping. Well, maybe not laws, exactly, but if you follow these guidelines, you'll come back with better stories to tell.

The early bird gets to start the fire.

A dubious honor at best, because you're really crazy to get out of the tent before there's a fire of smaller magnitude than Vesuvius. I've solved this problem by never planning a winter trip unless my pal Bill can go. Mister Sunshine greets the crack of dawn with frozen fingers and flaring matches, waking the rest of us with the smell of sausage and coffee. I'll stumble out of the tent, sheepishly rubbing ice cubes from my eyes and deliver my usual morning salutation, something along the lines of, "Gee, Bill, you got up first yesterday. You shoulda

***Warmth and sustenance** come at a price — in this case, being slowly smoked like a country ham. This camper toasts a marshmallow at the Black Mountain campground.*

woke me up and I'd have started the fire." Bill's never caught on to this ploy.

Whatever can turn to ice, will turn to ice.

A rule with applications from breakfast to the after-dinner wash bucket, this is one of the most oft-forgotten of the winter camping precepts. Even the experienced campers forget this dictum. Even the experts. Even me.

On one of our first trips to Mt. Rogers, we took chicken breasts, broccoli, potatoes and onions for an aluminum foil feast. No freeze-dried repast for us — we're experts! No one volunteered to share sleeping space with broccoli spears, so we took a chance and left the food outside, certain it would thaw during the day. Gotcha. The next night we cut onions with a wood saw and sliced potatoes with a hatchet. You think tableside chefs at Japanese steak houses can do tricks with a Ginsu knife? You ought to see us use a Swiss Army blade on a lump of frozen chicken.

Nor are the five food groups your only dietary problems with single-digit temperatures. Leave the canteen outside during the night and you'll wake to discover a new, inexplicable law of physics: the same volume of water weighs twice as much when frozen. Experienced winter campers heat a bottle of water just before bedtime, then toss it into the foot of their sleeping bag. Not only does it keep the toes from freezing — or thaw them out, as the case may be — but it ensures a small supply of water in liquid form when the sun rises and Bill starts heating up the morning coffee. We draw icicles to see who has to sleep with the fuel bottle.

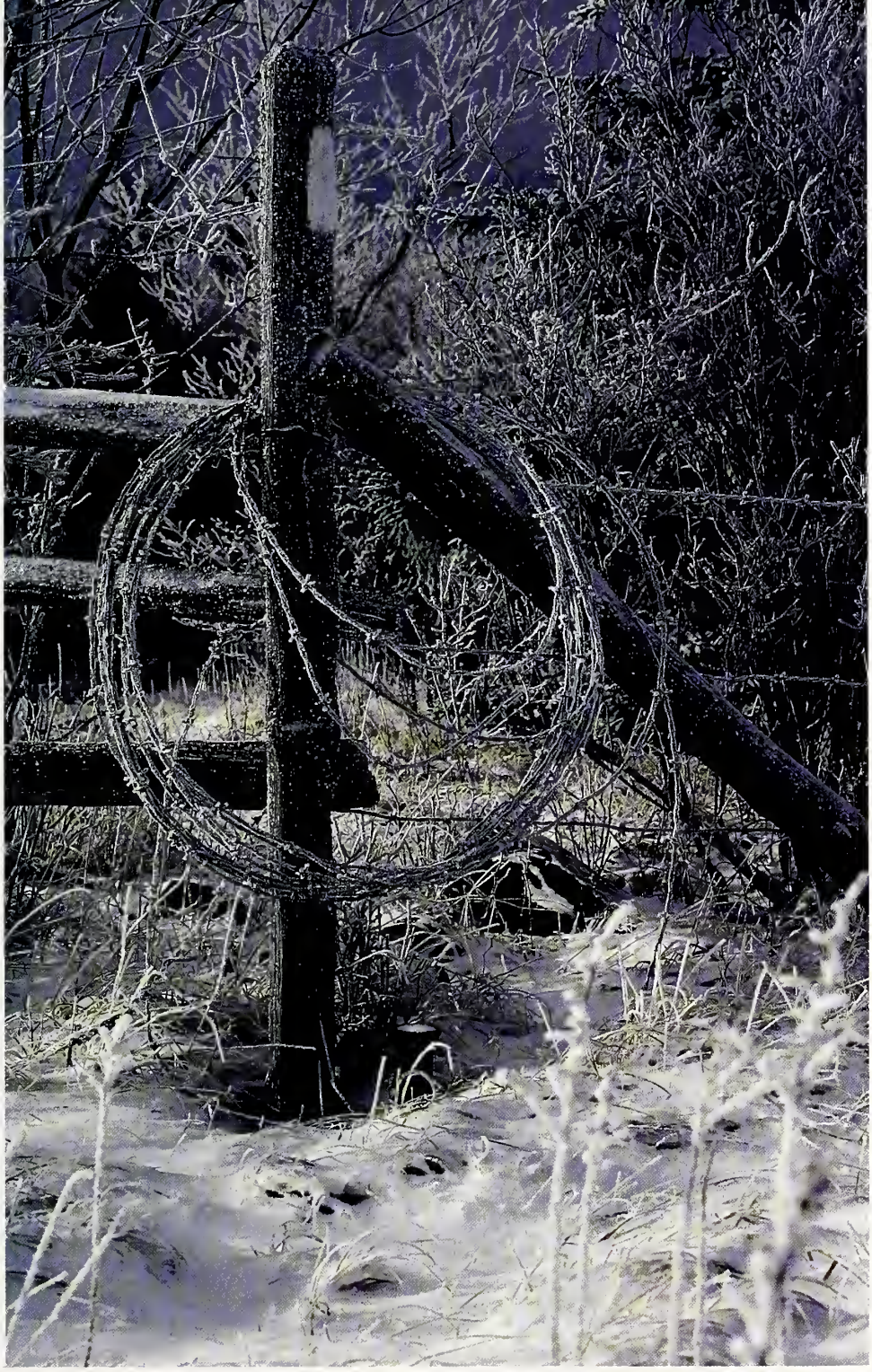
Of course, you can always melt snow for your water needs. But after falling through 20,000 feet of the last 200 years of gunk, it won't be Perrier. And don't take chances: boil water regardless of its original form, liquid or crystalline. *Giardia* isn't a new kind of freeze-dried pasta. It's a dangerous waterborne disease that will make staying warm the least of your concerns.

Keep in mind, also, that you and food aren't the only things that freeze. Boots, for instance. Leave the wet pups outside on bitter cold evenings and you'll likely share an experience common with my camping crowd: pounding your boots free of frozen mud. Glacier broccoli is often used to perform this task.

An apple a day ain't enough.

Hence, the foolproof full-belly plan. Winter camping is tough on the metabolism. The experts will tell you to load up on carbohydrates and fats, the first to burn when your body needs juice. Pretty scientific, huh? But leave the science to the white coats. My advice is simple. On the average three-day winter camping trip, plan on eating a minimum of enough junk food to outfit a cheerleading squad on a week-long summer camp. The best thing about a backpack is that your wife's "no more fat" refrigerator magnets won't stick to nylon. Take it as an omen. Any winter camper who isn't in a constant state of digestion is failing to pull his weight.

Top bet for trail food is gorp, a concoction of granola, raisins, M&Ms, sunflower seeds and anything else on sale at the gro-



***Scenes of uncommon** beauty await the camper willing to endure winter discomforts. The photographer found this glazed roll of barbed wire hanging alongside the Appalachian Trail.*

cery store. Nearly any recipe will suffice, however, as long as the original ingredients are organic.

Stop and smell the icicles.

Merely getting by from day to day is accomplishment enough for the winter camper, so why torture yourself with a 15-mile regimen? Leave time to enjoy the unexpected pleasures winter will sometimes drop in your lap: leaves trapped in tiny frozen waterfalls; fox tracks in fresh snow; camping partners willing to rent your hand-warmer for a king's ransom.

Once, while hiking along the open Appalachian balds, we happened upon a north-facing ravine that still harbored snow from the previous week's fall. Bill immediately sensed the beginning of a new era: sleeping pad bobsledding as full-blown contact sport. We slipped trash bags over the ends of our pads, took a running start and voila! You can catch the results on *Wide World of Sports* this winter.

Smile, though your heart is frozen.

Happy campers stay happy no matter how miserable they are. It's all in the attitude. You're cold? Well, what did you expect? It's January, for Pete's sake, and you're 10 hours from the nearest heat pump. If you wanted to be warm you could have gone to the Bahamas with the office girls.

A few years back we sojourned to Mt. Mitchell. The timing was perfect: the weather report cautioned that a major snowstorm was headed our way. Within 24 hours we were stranded in 20 inches of fresh powder miles away from the car. We couldn't hike farther, couldn't hike back. What were we to do?

First, we plotted an intense snowball fight. Then we built a fire and ate. Then, more snowball fights, followed by snowman-making, another quick meal, a demonstration of angel-wing art and a nice effort at igloo construction. Then we ate again. Took a nap, chose teams and mounted another snowball offensive. Soon it was lunchtime. We ate, then proceeded to start all over again. The point is, it's a given that you're going to be cold. It's a given that you may be cold *and* wet, but that's always a temporary condition — the car is only three days away. You gotta have the attitude. How else are you going to eat frozen onions and like it?

***A rail fence** jogs its way across a field of snow along the Blue Ridge Parkway in Doughton Park. Some of winter's stark beauty can be seen in spots reachable by automobile, but hiking will open grander views.*

***From an overlook** in the Shining Rock Wilderness Area, this camper views the winter landscape. Severe cold causes the rhododendron leaves to roll up in a season-long shiver.*

Out of light, out of your mind.

Which means you'll need a heap big pile of firewood to stave off both hypothermia and boredom, since the winter sun hits the hay by five o'clock, leaving you with little recourse but to sit down and talk to these maniacs that brought you out here with you.

Of course, getting a fire started with frozen wood is challenge enough, but be patient. Start with a small blaze, and stack frozen wood near the fire to dry it out before attempting to add it to the pot. And forget trying to do it like the oldtimers did, with shaved bark and a single match. The oldtimers didn't go out in this kind of weather for fun. Commercial firestarters are the way to go. Even the most ardent purist isn't averse to a little white gas coaching if he's cold enough, but don't expect to go home with any eyebrows.

Our favorite fireside game is played with wet wool socks and boots. It's always great fun to see who burns their socks first while attempting to dry them out by a fire the intensity of which melts Vibram lugs. Another perennial pastime is the hatching of various schemes to rid the trail shelter of abusive rodents. I once woke to see a field mouse scamper across a snoring camper's forehead.

And then, when the fire's last tongues of flame are licking at stars shining through a sky as cold and clear as ice, it will be time to proclaim the sacred words to your fellow fools.

"Night hike!"

You're crazy, remember? ⊠

NIGHT OF THE LIVING SKUNK

A pungent nocturnal visit piques an interest in the polecats and civet cats that live in fact, lore and legend in North Carolina.

By Doug Elliott

Illustrations by Jackie Pittman

I was sound asleep up in the loft of the little log cabin at the foot of the Black Mountains in Yancey County. In exchange for living there, I had been working on the cabin. I had finished the chinking, sealed the windows and hung the doors, and I was pleased with my progress. Winter was coming and I knew the cabin was tight. I was stretched out on a mattress in the loft, one hand poking out from under the covers, and I was dreaming that a small animal was licking my fingers. As I woke slightly and rolled over, I heard a rustling in the back of the loft and realized that I was not alone. I quietly groped for my flashlight, pointed it at the noise and flicked it on. Indeed I was not alone! There in the beam was an impeccably marked, sprightly little spotted skunk!

"How did *YOU* get in here?" I asked, thinking not only of the skunk, but also of the threat to my bedding, my expensive down sleeping bag and all my good clothes hung up here in the loft.

Then I smelled it. No, this wasn't the full blown spray! Apparently the skunk had released just a tiny droplet of its scent as a warning. Immediately I understood the implications of an aggressive encounter with my uninvited guest. My second question wasn't long in coming. "Never mind how you got in here. How are you gonna get out?" I asked.

The skunk, who was at least as uneasy as I was about our surprise meeting, slinked along the wall behind some boxes then gracefully scampered the width of the cabin along an open log rafter and out a small hole under the eves. I stuffed a rag in the hole and breathed a long sigh of relief.

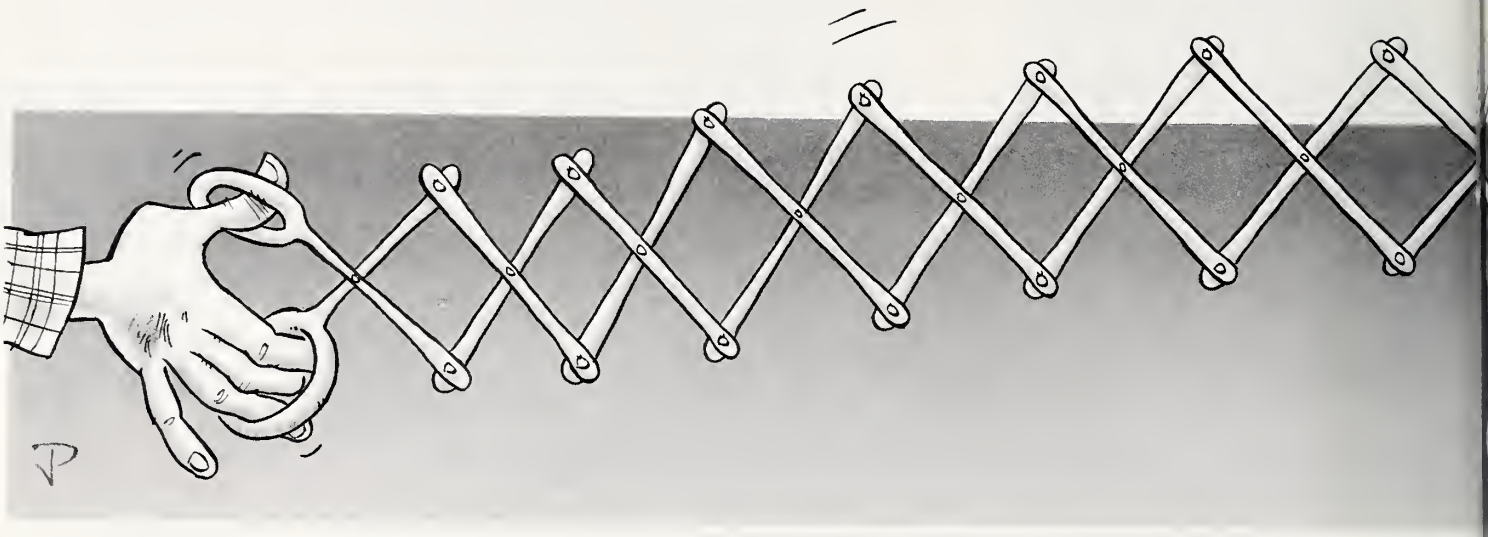
The next morning I recounted the night's adventures to my landlord. "Oh yeah, we call him 'the inspector,'" he said. "He comes around to check on your work to see if you've done a good job closing in the cabin. If you've left any holes anywhere, he'll find 'em."

You can believe I went over that cabin with a fine-toothed comb and closed up every possible skunk-sized opening. And it's lucky I did because, sure enough, the inspector was back in the yard the next night, and came snooping around quite regularly after that. I started to enjoy his visits (outside the cabin, that is) and would leave offerings of food for him. He would eat most table scraps but seemed to especially enjoy meat and peanut butter. It wasn't long before I could sit quietly at the back door and the skunk would come right up to me, prop its front feet on my knee and eat peanut butter off a stick I was holding.

This skunk was hardly bigger than a large squirrel, which is the normal size for this smallest member of the skunk clan. The spotted skunk is known for its agility and its ability to climb. It is often called "civet cat" by mountain folks. Of course it's no more a cat than is its larger cousin the striped skunk, which is known as the "polecat" (These are actually names of musk-bearing Old World animals. When the first European settlers encountered skunks in North America, they applied these familiar names to them, and they are still used to this day.)

Skunks are actually in the family *Mustelidae*, the musk carriers. Included in this family are the weasels, mink, marten, otters, badger and wolverine — all have musk glands. This is a very vigorous and diverse family that has dispersed its members to every conceivable niche on the continent, and each has its specialty. The river otter and the mink have adapted to fresh water, the sea otter lives in the kelp beds off the Pacific coast, the marten lives in northern tree tops where it leaps from tree to tree in hot pursuit of red squirrels. Weasels are agile predators, easily able to slip into narrow rodent burrows. Badgers are powerful diggers. The wolverine is the most fierce and powerful of all and lives in sub-arctic regions.

Skunks, however, thrive in almost all parts of the continent except the extreme north. Their only specialty is their highly evolved (and extremely accurate) musk glands. A gland is located on each side of the anus, and a skunk rarely misses. While looking straight at its target, the skunk can swing its rear end around and fire away! Although this response is automatic, the quantity is limited to about five or six shots. Perhaps because of this, or simply because of its mellow temperament, a skunk shows restraint and would much rather avoid a confrontation. When it first senses danger, a skunk will try to retreat, waddling away with its characteristic ambling gait. If it is still molested, it then gives warning. The striped skunk may stamp its front feet on the ground, growl, hiss or click its teeth. The acrobatic spotted skunk may even do a "hand stand" when agitated and walk about on its front legs. Then up goes the tail — straight up like a magnificent bushy plume. This is the moment for you to head for cover. In a flash the skunk whips into its U-shaped battle position, its head and rear on target facing the enemy. It can shoot up, down, left, right, or straight ahead. The skunk holds its gorgeous tail daintily aloft so as not to soil its own fur (or block the care-



fully aimed stream of spray)!

The two vents of the glands protrude like twin nozzles as the powerful hip muscles contract and squeeze two fine streams of oily, yellowish liquid towards the target. These streams merge about a foot away from the animal into one spray of very fine droplets. This spray is aimed at the face of the attacker and is amazingly accurate up to about 12 feet. If the wind is right, the spray can actually carry 6 or 8 feet farther.

If the spray gets into the eyes, it will burn like fire, but it does no permanent damage. Flushing the eyes with fresh water will hasten recovery, but even without this, the stream of tears will wash the spray out within 10 or 15 minutes. (That's usually enough time for the skunk to be long gone). I have talked to a number of folks who have caught an eyeful of skunk spray. Though they all agreed that it hurt at the time, most of them believe it has actually improved their eyesight — a fairly common bit of folklore that may someday be worthy of study.

Of course the most noteworthy quality of the spray is its overwhelming musky stench. It can sometimes be smelled from a half mile or more away. Most people find it disagreeable or nauseating. Numerous ways are recommended to remove the smell from one's clothes and person, including washing in tomato juice, vinegar, gasoline, ammonia, or chloride of lime. There is even a commercial preparation sold in pet stores for this purpose. Old trappers were known to bury their clothes in the ground for a week or so and then to smoke them over a fire of juniper and cedar. Equal parts of citronella and bergamot oil has been used to neutralize the scent on one's body, but in dissipating skunk odor, time is your best ally. I have a couple of skunk hides hanging on my wall. They were roadkills and when I first prepared them, they were rather strong. Now however, if they remain dry, the aroma is not noticeable. If the air is humid or you sprinkle water on them it is a different story.

One cool, drizzly evening, I happened to be in New York City. I was walking down Fifth Avenue behind two elegantly dressed women. One was wearing a beautiful silky black fur coat. I couldn't help but notice that mixed with their scent trail of expensive French perfumes was the distinctive odor of skunk emanating from that costly fur wrap. She might not have known that what was sold to her under the furrier's trade name of "Alaskan Sable" or "Black Marten" was really skunk. The odor surrounding her was the skunk's posthumous revenge, a measure of poetic justice. And to tell you the truth, my simple taste found that mild, musky whiff of skunk preferable to those fancy perfumes!

Striped skunks are still trapped for their fur to some extent through most of their range. Those hides with the least amount of white bring the best price.

Unless they are starving, very few predators will risk a spraying for a meal of skunk meat. The great horned owl, however, is an exception. These huge nocturnal birds often capture and feed on skunks. Apparently they are immune to the smell and often carry the odoriferous residue of their prey on their feathers for months at a time. If you aren't squeamish, you might even find out for yourself that skunk meat when *VERY* carefully cleaned is tender and delicious. You may even want to render out some of the grease. It is a traditional home remedy when rubbed on the chest for respiratory ailments and used as a liniment for arthritis.

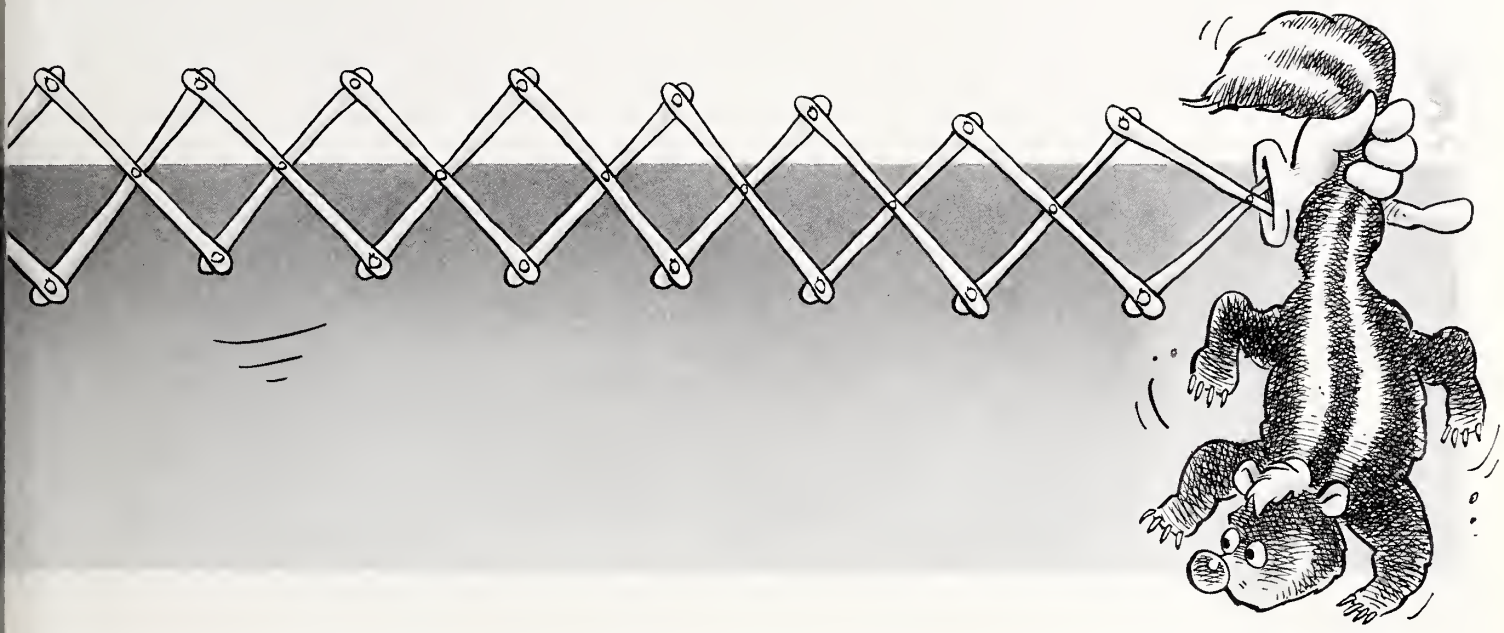
February and March is mating season for skunks. When the females come into heat, the males will travel long distances looking for them. This is a time of frenzied activity and sometimes even large, unruly gatherings of male skunks with much fighting and squealing. Sometimes they even spray each other!

The spotted skunk tends to be more bold than its larger striped cousin and during this "mating madness" it can be even more outrageous. One such skunk was reported to have run right up to a reclining bull and sprayed it in the face! Another reportedly invaded a wolf's den and shook the young wolves by their ears.

In skunks and other mustelids, copulation is repeated and very prolonged — up to one or two hours. Apparently the female skunk will not ovulate unless she is thoroughly aroused by long and vigorous copulation. The penis is stiffened by a bone, the baculum, which facilitates the process.

The young striped skunks are born after about a two-month gestation period. Because of delayed implantation of the egg on the wall of the uterus, the spotted skunk's gestation can be twice that long. The litters are usually from three to eight in number. After the young are about seven weeks old, they can be seen on hunting expeditions following the mother in a single file. By summer's end they are on their own.

Once I was sitting in the woods when I heard a rustling in the leaves coming my way. As I watched and waited, a large striped skunk moseyed past. I sat very still and as the wind was in my favor, the skunk did not



know I was there. After it passed, I carefully got up and followed. The skunk was poking along with its nose to the ground, hunting for food. Occasionally it would stop, scrape away the leaves or dig into the soil and quickly munch down a bettle, worm or some other insect. I carefully followed about 20 feet behind, trying to be as silent as possible, but the leaves were dry and before long, I crunched a dry twig and made a loud rustling noise in the leaves. When I did, that tail flew straight up and the skunk whirled around ready for action. I froze in place and did not move a muscle! The skunk squinted in my direction, lifted it moist black nose and sniffed the air. (A skunk's eyes are rather weak and not able to discriminate color or fine details that are not moving.) I held my pose like a statue. Soon the skunk was satisfied that nothing was there. It turned around and continued its foraging, with me tip-toeing along behind like a big clumsy shadow.

Several more times I created a disturbance and the skunk whirled around ready for action. But I immediately did my statue routine, freezing until the skunk continued on its way. Then the skunk began digging a hole and soon its head was down in the earth. Before long, it was up to its forequarters in the excavation. With its head in the hole, it couldn't hear well and I was able to creep up very close. I was curious to know the object of this furious digging. I peered cautiously around a tree right behind the skunk and watched. Soon the skunk had half its body in the hole. Then it rolled out a grey object, the size and shape of a large potato. I could see its jaws smacking as it pulled this thing apart and ate the contents. Small insects were buzzing around its head. After the skunk departed I examined the excavation and realized that it had just devoured an entire nest of yellow-jackets. The skunk's long thick fur coat must have given it some protection from their stings, but still, any critter that can take on a nest full of these powerful stingers has got my respect! Indeed insects of all kinds make up the major part of a skunk's diet. In fact, efficiency at destroying the hop grub in New York State earned skunks legislative protection in hop growing areas. (Next time you sip a cold beer, you can thank a skunk!)

Foraging skunks are nimble and quick. They catch and eat mice, rats, voles and other small mammals as well as snakes and other reptiles. (Some evidence suggests that skunks may be immune to the venom of the poisonous snakes they sometimes eat.) They appreciate all kinds of fruits and berries and occasionally eat the eggs and young of ground-nesting birds. (Now before you bird hunters start a campaign against skunks, realize that they probably save the lives of many ducklings and other water birds by digging up and eating the eggs of snapping turtles.)

Sometimes a skunk will cause problems by slipping into a poorly fenced hen house to eat eggs, and occasionally one will raise the ire of a beekeeper by visiting a hive at nights and scratching at the entrance. When the bees come out to investigate, the skunk swats them and gobbles them up. The remedy for this is to take a large piece of wire mesh to the front of the hive so the skunk can't get at the entrace or to place a board full of protruding sharp nails on the landing board at the front of the hive. This will make bee swatting a painful experience and will soon discourage the skunk.

If you ever want to get rid of a troublesome skunk without incurring its spray, use an enclosed or covered live trap. In a dark enclosure a skunk will feel secure and it can be gently transported and released far away from trouble.

While I don't recommend it as a technique for removal, it is also possible to pick up a skunk by the tail without getting sprayed. I have done it several times. Apparently, in order to spray, a skunk must hold its tail at a right angle to its body. When being held by its tail, the skunk can't spray. Of course it is difficult to approach a skunk close enough to grab it. I have only been able to do this when the skunk is partially concealed and thinks it is hiding. You must grab the skunk's tail firmly, and swiftly lift it off the ground. (There are no second chances in this game!) Once you are proudly holding the skunk by the tail, the next question that will occur to you is, "How do I put it down?"

If you find yourself in this position, just give me a call, (I'm in the book) and if you don't get my answering machine, I'll be glad to tell you!

Seriously, all you need to do is toss the skunk with a gentle underhand swing so that it lands about 10 or 15 feet away. It usually lands on its feet and in an unruffled, dignified manner, it will calmly walk away.

© 1988 by Doug Elliott

Doug Elliott's most recent book, *Woodslore and Wildwood Wisdom*, can be ordered from Possum Productions, Rt. 1, Box 388, Union Mills, N.C. 28167 for $10 post paid.

Good News For Peregrines And Their Friends

KEN TAYLOR

From peregrine falcons to alligators, spiny mussels to flying squirrels, projects to study and restore North Carolina's nongame and endangered species are getting results.

By John Alderman

Here's a success story — one you may well have helped make possible. Perhaps you were a volunteer who helped professional biologists on one of these special programs. You may have helped release peregrine falcons, or watched the nest sites. Or maybe you were one of the rock climbers who voluntarily avoided climbing near those nesting sites.

More likely your help took the form of a contribution through the state income tax checkoff for nongame and endangered wildlife. Over the past four years, contributions donated to help nongame and endangered species in North Carolina have risen sharply. In 1988, for example, donations through the income tax checkoff reached more than $420,000, and that money is earmarked specifically for use by the N.C. Wildlife Resources Commission's Nongame & Endangered Species Program.

These donations have helped the program achieve measurable success through the efforts of the Wildlife Commission's nongame staff — Randy Wilson, Jack Donnelly, Tom Henson, John Alderman, Allen Boynton and Lisa Whitman. The state nongame staff has also been greatly assisted by cooperative efforts with federal wildlife agencies, private organizations and the public.

What follows is an update on the work currently underway to assist nongame and endangered species in North Carolina.

Peregrine Falcons

A jubilant voice on the phone conveyed a message much awaited by the many people who had watched a pair of adult peregrines at Whiteside Mountain during the past few weeks. Scott Ball, a temporary employee with the Nongame Program, had gone to the site for a weekly observation and had seen a newly fledged peregrine flying with the adults. Biologists were hoping that the pair had been nesting. The peregrine had certainly given every indication of doing so, but the nest site was completely hidden from observers. Now, the nesting was confirmed. The young bird quickly gained flying ability, and visitors to the mountain were treated to a look at the first confirmed naturally bred peregrine falcon to fledge in North Carolina since 1957.

The state's conservation community has reached a milestone in its peregrine falcon restoration project. With the help of volunteer falcon watchers, wildlife biologists found five pairs of peregrine falcons defending territories at mountain cliffs in April. Three of these pairs made nesting attempts. Two pairs each raised a single young to fledging age. While this level of reproduction will not sustain the newly established peregrine population, these successful nesting attempts augur well for the future of this magnificent predator in North Carolina.

North Carolina biologists will continue releases of young, captive-bred peregrines for several years more, but we will release fewer young each year. This year, the Nongame Program released 18 young peregrine falcons on Blue Ridge Parkway property near Mt. Mitchell and on Grandfather Mountain Inc. property. Biologists have released 63 young peregrines in North Carolina since the restoration effort began in 1984. Our goal is to establish at least five breeding pairs throughout North Carolina's mountains. The Nongame Program's biologists expect to achieve this objective within two years. The project emphasis will then switch from releases of young peregrines to protection and management of nesting peregrines.

Also during this past September, the Nongame Program assisted the National Wildlife Federation and several other southeastern states in sponsoring the Southeast Raptor Management Symposium held in Blacksburg, Virginia.

Tar River Spiny Mussel

The Tar River spiny mussel is one of the most endangered species on earth.

Last year, Dick Biggins, U.S. Fish & Wildlife Service biologist, came to Swift Creek, a tributary of the Tar River, to help us continue a two-year survey. Although our staff had found living spiny mussels in the main channel of the Tar River in 1987, they also discovered spiny mussel shells in Swift Creek. This was an exciting discovery, because spiny mussels had only been found in the main channel of the Tar River during all past surveys. This meant that there was a greater opportunity to prevent the species from becoming extinct. When Biggins joined us, we were all eager to verify that living spiny mussels inhabited Swift Creek.

***A young peregrine** falcon (above) surveys a valley from its release site on a western North Carolina mountain. In recent years this endangered species has made a dramatic recovery throughout the eastern United States thanks to restoration projects and a cleaner environment.*

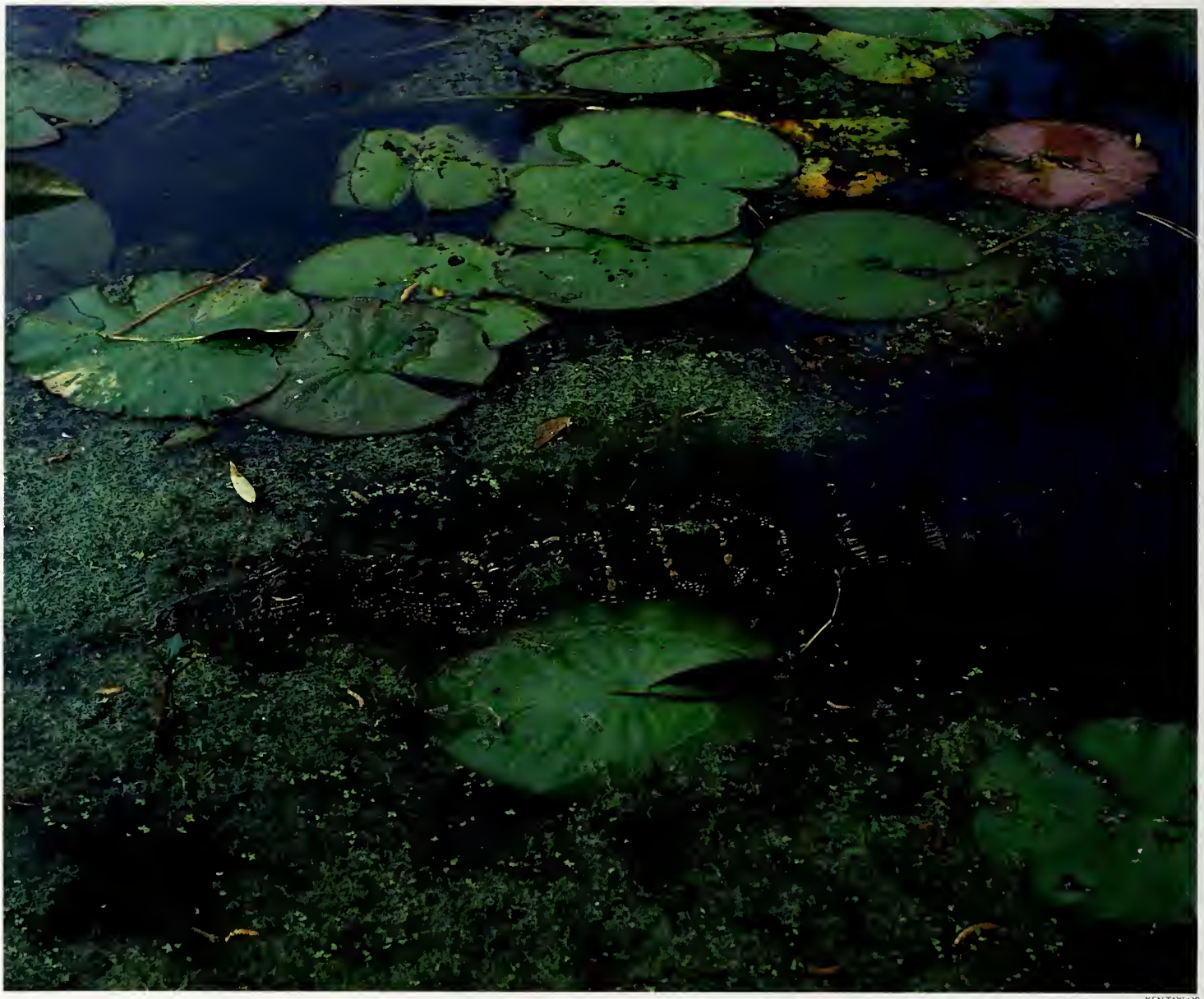
CURTIS WOOTEN

***Hacking cages** are used to introduce young peregrine falcons to potential future nesting sites. The young birds obtained from captive breeding programs are observed and fed sight unseen. The birds are able to leave the cages, and feedings are gradually reduced as the young peregrines become acclimated to their new surroundings and learn to hunt on their own.*

Although it was early June, the water in Swift Creek was still icy cold at 8 a.m., and voices seemed to hit a higher pitch as we slid into the water up to our waists. At our first stop, we found eight mussel species, but no spiny mussels. Next stop, no spiny mussels. The same was true again and again as we proceeded farther and farther into the deer fly-infested Swift Creek basin.

Then, in early afternoon, just when the flies were most active, we found what we considered ideal spiny mussel habitat. Biggins sat down in the creek, reached into the substrate, and pulled out a living, eight-spined Tar River spiny mussel. Although no other Tar River spiny mussels were found that day, we had verified that the species continued to exist in the creek.

The Nongame Program can now work to protect and manage this population of the Tar River spiny mussel in Swift Creek. Also, as a result of the program's survey, we now have a much better understanding of the present status of other mussel species throughout the entire Tar River Drainage Basin. In general, as seen in other rivers throughout the United States, mussel species are declining in the Tar River. These long-lived animals are an extremely important indicator of water quality. As long as they can continue to survive in our waters, we can feel reasonably secure drinking this same water. The Nongame Program is making a concerted effort to survey and to find ways to conserve these species throughout North Carolina.



KEN TAYLOR

ALLIGATORS

As we headed up Queen's Creek in Onslow County, we rounded a bend and approached a group of people fishing from a boat dock.

"There's an alligator over there," called one of the fishermen.

Coincidentally, our purpose for being on the creek was to conduct counts of alligators. We stopped the outboard so that we could talk, and it was soon apparent that the excited fishermen had just seen their first "gator" in the wild. The excitement was probably greater than it would have been if they had landed an 8-pound bass. After explaining our purpose, we proceeded to the starting point of the survey several miles upstream to await nightfall. A few miles away, on other streams, two more crews were poised for the same activity.

Queen's Creek contains one of the survey routes set up in 1979 by N.C. State University to assess alligator populations in North Carolina. Tim O'Brien, under the direction of Dr. Phil Doerr and Dr. Jay Hair, surveyed eight watersheds in the Coastal Plain during 1979 and 1980. A spotlight was used to conduct night counts of alligators throughout randomly chosen routes, and efforts were also made to estimate the lengths of animals spotted. Over the next several years, the Nongame and Endangered Wildlife Program plans to repeat those surveys so that comparisons can be made in population levels. During the past two years, surveys have already been completed on parts of four watersheds. Although in 1987 the U.S. Fish and Wildlife Service changed the alligator's official status from endangered to threatened, information from these surveys is still vital to sound management of alligator populations, and because alligators are still protected under the Endangered Species Act, the change in status gives the state more options in managing these populations.

SEA TURTLES

The voice on the phone had a distinct Spanish accent, and it was extremely difficult to comprehend exactly what the question was. After several minutes, it became apparent that the caller was inquiring about the Sea Turtle Conference to be hosted by the Nongame and Endangered Wildlife Program in February 1988. As it turned out, he was a turtle researcher from Costa Rica who was doing research on the Kemp's Ridley Sea Turtle nesting beaches in that country. The call points out the wide attention this conference attracted and, more important, the growing interest world-wide in sea turtle species.

The Eighth Annual Conference on Sea Turtle Conservation and Biology was held at the North Carolina Aquarium at Fort Fisher

Alligators (left) have made a dramatic recovery in eastern North Carolina in the past decade, particularly in the Wilmington area. The animals here are on the northern edge of their range, however, and growth and reproduction are slow.

on February 24-26, 1988. Forty-five speakers presented results of their research and survey efforts involving all five species of sea turtles found in the Atlantic Ocean to an audience of over 200 biologists and interested parties. Virtually every state on the Atlantic and Gulf coasts was represented as were several foreign countries. Subjects included nest protection efforts, threats to adult turtles, genetics, and law enforcement.

Hosted by the N.C. Wildlife Resources Commission's Nongame and Endangered Wildlife Program, with cooperation from the Aquarium, the Biology Department at UNC - Wilmington, and from our many sea turtle volunteers, the Conference proved to be a huge success. Meetings that permit free exchange of information and ideas are essential to managing not only sea turtles, but all species of wildlife.

Flying Squirrels

A light rain fell as we headed up the steep path toward the last nest boxes we wanted to check that day. We had already found four endangered northern flying squirrels in nest boxes on this trip. This was exciting because it indicated a sizable population in habitat we had discovered in 1987. Even so, Allen Boynton, Mountain Project Leader for the Nongame Program, wanted to check a few last boxes in an unlikely place for this species —an exposed ridge with much dead timber.

Dr. Peter Weigl, the principal investigator for the northern flying squirrel survey, said that he'd eat his hat if we found squirrels there.

As we headed back down to our vehicles and lunch having found two beautiful flying squirrels, Pete Weigl ate his words, if not his hat.

Following two years of intensive survey effort, we know a lot more about this species' distribution than before. This mysterious species occurs in five areas of the state's mountains. However, our knowledge of its ecology is rudimentary. Biologists need information about the squirrel's food and cover requirements, seasonal movements, reproduction and mortality if they are to conserve its surviving populations. The Nongame Program will fund a study of the northern flying squirrel's ecology with a grant received from the U.S. Fish and Wildlife Service.

KEN TAYLOR

***Volunteers monitor** deserted beaches during the summer for nesting loggerhead sea turtles. Nests are often protected from predation by wire screens, and may also be relocated to higher ground if they are in danger of being washed away by the sea.*

Small Grants And Other Projects

In addition to these highly visible projects, the Nongame Program expanded several projects during the year, including the coordination of sea turtle and colonial waterbird management and conservation along the coast, and development of a computerized data information system to help manage the state's nearly 900 vertebrate species. Other expansions include reintroduction of the threatened spotfin chub into the Great Smoky Mountains National Park, and a survey for endangered species in the proposed superconducting supercollider area.

Of particular importance is the initiation of the Small Grant Program that awards grants to researchers and other groups to learn more about specific species. Approved in November 1987 by the Wildlife Resources Commission upon recommendation of its Nongame Advisory Committee, the Small Grant Program was funded at $50,000 with individual awards limited to $5,000 or less.

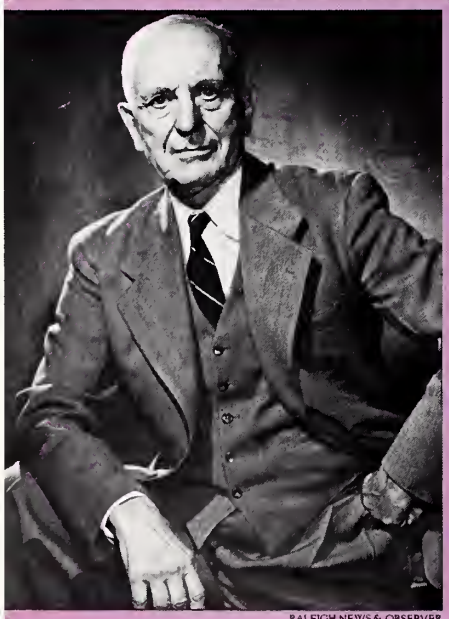
During 1988, 19 of these grants were awarded for the following species or projects: spotfin chub, sea turtles, rock shrew, rock vole, Rafinesque's big-eared bat, shortnose sturgeon, mountain shrew, Henslow and Bachman sparrows, and Sandhills chub and Pinewoods darter. Also funded through these small grants were projects for outdoor classrooms, a study on the effects of urbanization on nongame, a schoolyard wildlife project, Horizons Park habitat improvement, creation of a database of rare breeding birds, a study of colony site selection by wading birds, an education program on nongame birds, interpretive park signs, and a nongame brochure.

Allen Boynton, Tom Henson and Randy Wilson assisted in the preparation of this article.

Who Cares For Wildlife?

NONGAME & ENDANGERED WILDLIFE FUND

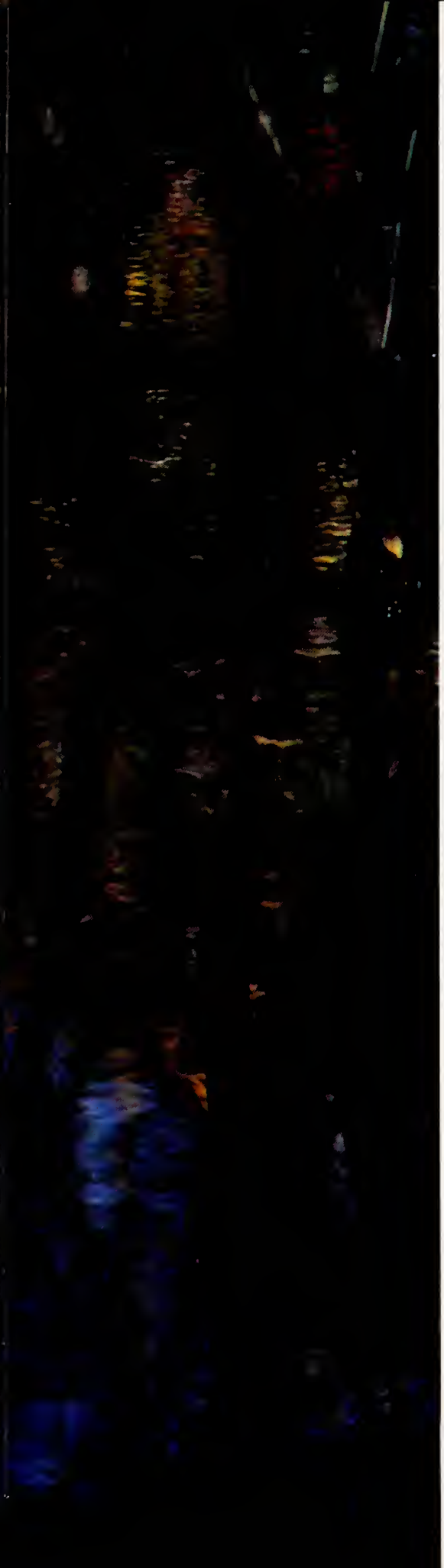
You do, of course, and that's why you may like to know you can earmark a donation to specifically help nongame and endangered wildlife. Make your contribution directly or through the income tax checkoff to the Nongame & Endangered Wildlife Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.



RALEIGH NEWS & OBSERVER

The Natural Gardens of B.W. Wells

by Lawrence S. Earley



TIM HERGENRADER

B. W. Wells found his life's work in a field of wildflowers near Burgaw, and changed not only his thinking but also the way we look at North Carolina's landscape.

LAWRENCE S. EARLEY

***B. W. Wells** (inset) at 81, photographed in 1955 on being honored as "Tar Heel of the Week" by the* Raleigh News & Observer. *Wells championed an ecological understanding of plants and plant communities. The rare pine barrens gentian* (Gentiana autumnalis) *is found in some of the clay-based Carolina bays of the type that Wells studied.*

John Lawrence moves quietly through the old farmhouse, ignoring its ante-bellum past as he paints a rosy-hued future. "This part will be a hall for meetings," he says as we look at a large ground-level room. "We've tentatively thought of turning the upper rooms into an assembly hall for Boy Scouts and others who will help maintain the trails."

The 154-acre farm once nestled in the loop between two bends of the Neuse River in Wake County. Today Falls of the Neuse Lake inundates part of the original boundaries and the visitor must contend with the roars of speed boats that bruise the morning air. The farm is like another home for Lawrence, even though it's not his own. The retired park planner cheerfully volunteers much of his time to help maintain the farm buildings, clear trails and host visitors. His dedication is touching. He seems an elderly acolyte, offering a votive candle of devotion to the memory of a man — and to a vision.

The man is B. W. Wells, the eminent botanist and ecologist who lived on this farm with his second wife Maude from 1954, when he retired from N.C. State University at the age of 70, until his death 24 years later. The vision, promoted by the tiny B. W. Wells Association, of which Lawrence is a member, is that the farm be someday turned into an educational center to honor Wells.

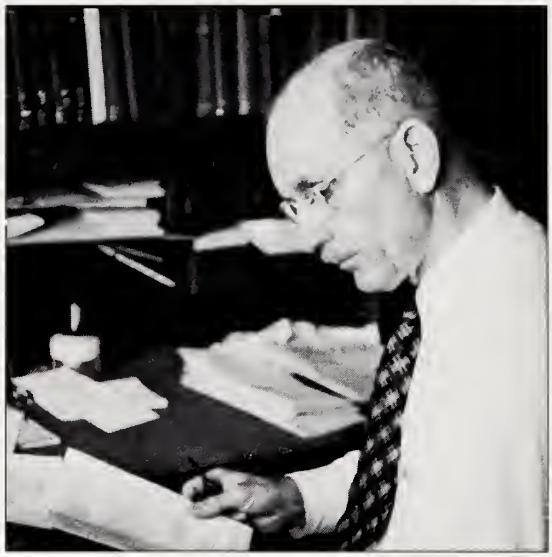
"It's ideal for teachers and students," Lawrence says, "and the farm setting is perfect because Piedmont farms are getting to be very scarce." He envisages it as an ecological center where school children, college students, scouts, garden clubbers and birdwatchers can meet and walk the trails.

Current plans show that the B. W. Wells Interpretive Area will open in March 1991, although exactly what shape it will take is uncertain. The Wells Association has been pushing for a smaller center with more of an emphasis on education and less on recreation. In any event, it's not a top priority with State Parks and funding levels for necessary renovations are low. One day the B. W. Wells Interpretive Area will become a reality, and honor will be given — long overdue — to a man who honored the state with his teaching, his scholarship and his fierce concern for what made North Carolina special.

Bertrand Whittier Wells was a pioneer ecologist, a passionate conservationist, a careful and sometimes contentious scholar and the author of many influential scientific papers. Though recognized in his day as the outstanding student of the Coastal Plain, he devoted much of his life to popularizing an ecological understanding of North Carolina. His ecological approach was unique for his time, yet some say he is yet to get the professional recognition he deserves. Indeed it may be ironic that he is remembered today mostly for a book he wrote for the layman, *The Natural Gardens of North Carolina*.

Born in Ohio, he was 35 years old when he came to North Carolina State in 1919 as the chairman of the Botany Department, a position he would hold until 1949. He already had a national, even inter-

national, reputation as an authority on insect galls, a speciality that he had pursued for almost 10 years. But in the spring of 1920, a trip to Wilmington by train changed his life. ". . . out of the railroad car window, I saw a vast flat area literally covered with wild flowers," he recollected years later. "I im-



mediately made up my mind to see it again . . . I became convinced there was no such area of equal size and perfection with over a hundred species of herbaceous wild flowers blooming in profusion from late February to middle December."

It was the Big Savannah, a 1,500-acre bog a half mile wide and nearly two miles long near Burgaw that bloomed nearly continuously all year long. It was the first of several natural areas throughout the state that he was to call "natural gardens." His eye might have been caught by the beauty of the year-long flowering, but his scientist's mind was asking new kinds of questions. Why do these plants grow here and not elsewhere? What factors make them grow here in such abundance? He was looking not at individual plants but the way they related to their environment, an approach that embraces what we mean by the word "ecology."

Today the word ecology is commonplace — when we look at the interrelationships between plant, animal, soil and other factors, we're talking in ecological terms. But we forget that even 40 years ago the word was known only to specialists. Dr. Stephen Boyce, one of Wells' students at N.C. State in the late 1940s, recalls that when he told his family he was getting his Ph.D. in plant ecology, they asked, "What's ecology?" In the 1920s, when Wells began his ecological investigations, ecology was the new kid on the scientific block, and not very well respected.

Wells's interest in insect galls quickly evaporated. He was now a practicing ecologist. "That was the way he was," says Dr. James Troyer, Professor of Botany at N.C. State, the author of *The Natural Botanist of North Carolina*, an unpublished biography of Wells. "He had tremendous enthusiasm. When he got interested in something, everything else went."

Wells's professional life started anew. The vast natural areas of the North Carolina landscape beckoned to him now and soon he was ranging widely across the state, stunned by the diversity of plant habitats he found.

"Within two or three years of discovering the marvels of the Big Savannah," says Troyer, "he had surveyed all the big plant communities of the state and written a publication — it was only a few pages — that completely catalogued and described all the major communities in the state from the coast to the mountains," says Troyer. Incredibly, he had comprehended the plant communities of the state in essentially the same way that they are regarded today. "He had a gift for looking at natural vegetation and seeing things that other people couldn't," says Troyer.

After his statewide survey, Wells began to study in depth the various plant communities he had identified. The Big Savannah, a grassy bog, was first. Over the next 10 years he made other studies of the Sandhills longleaf pine-turkey oak-wiregrass community, pocosins, Piedmont old fields and mountain balds. Wells spent relatively little time in the Piedmont and the mountains; the Coastal Plain remained the arena of his most important contributions. "He had a particular affinity for the Coastal Plain," says Dr. Art Cooper, head of the Department of Forestry at N.C. State. "He told me that was where the real problems were. I didn't entirely agree with that view."

In 1932, Wells summed up his discoveries about the state's ecosystems in a book that many call his masterwork: *The Natural Gardens of North Carolina*. It was intended to be about the wildflowers of the state, and so it is — but with a typically Wellsian touch. Though Wells was sympathetic to the wildflower enthuasiast's need for an aid in plant identification, he wanted him or her to look at plants ecologically. ". . . it is hoped that sufficient material has been presented to assist the plant lover . . . in the process of thinking ecologically," he wrote in his Introduction. This is the way to think, he lectured, "and only when we are thinking in this manner do we make advances in the pursuit of truth and genuine understanding." Only by understanding the way wildflowers fit in their immediate environment, he was saying, could we truly understand them. Thus his book was not organized around the wildflowers themselves, but around the 11 plant communities in which they were found.

Characteristic of Wells's handling is the first few pages of the first chapter, where Wells discusses the seaside plant communities. Within just three paragraphs Wells is discussing shifting sand, prevailing shoreward winds, salt spray off the ocean, and the reflection of heat and light as factors that shape and determine the plant community there. All this without ever mentioning a single plant.

In subsequent chapters, Wells discusses inland marshes, swamp forests, the evergreen shrub bogs or pocosins, the grass-sedge bogs, the sandhills, old fields and the boreal forests of the mountains. Along the way, Wells describes in simple terms the ecolog-

CURTIS WOOTEN

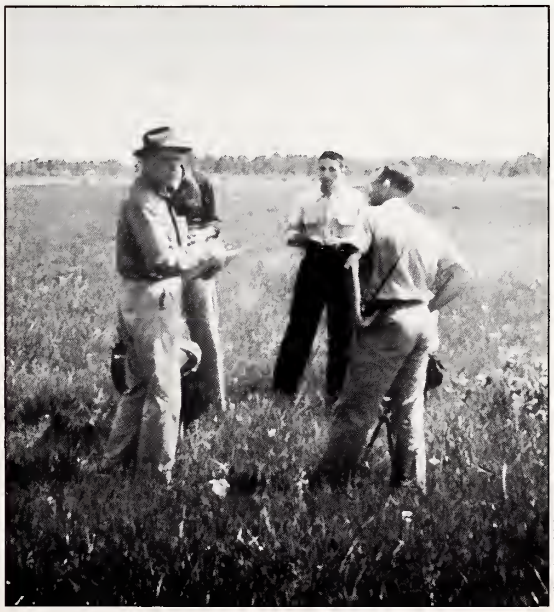
***A longtime professor** at North Carolina State University, Wells was an early student of the state's natural gardens. Pitcher plants (above) were part of the diverse spectacle of plant life that astonished Wells on his arrival in North Carolina.*

B. W. WELLS

ical factors that determine particular habitats. In the chapter on pocosins or shrub bogs, for example, here is Wells on why peat underlies these vast and desolate areas.

The water in the surface soil layer . . . succeeds to a high degree in drowning billions of those invisible denizens of soil, the bacteria and fungi. This situation results in the slowing up of the decay process, for, as everyone knows, when you keep micro-organisms away from organic matter, there is no decay, as the vast supplies of canned goods testify. Hence it is that bogs are, in a sense, one of nature's canning factories, where plant products are preserved.

Such clear and simple language was a Wells trademark. He never forgot the maxim that a good teacher is also a good entertainer. His chapter titles, for instance, were bright and colorful. "Where Winter Never Comes" headed the chapter on pocosins and he called the grass-sedge bogs "The



ARTHUR W. COOPER

A talented painter, *Wells depicted this salt marsh (above) lying across from Bald Head Island. At left, Wells (in hat) and others stand in the middle of the legendary Big Savannah in the 1950s.*

B.W. WELLS

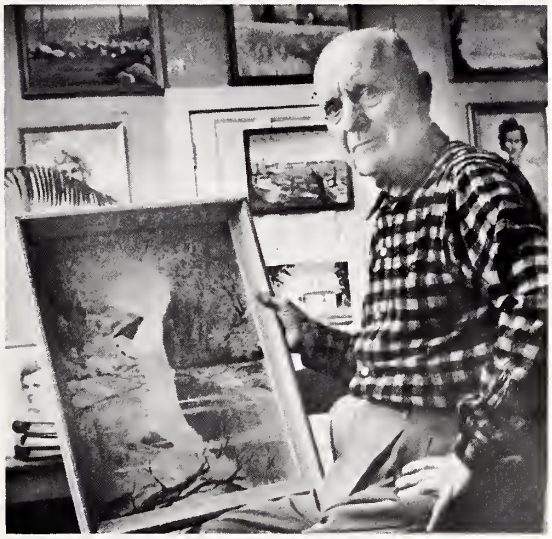
Most Beautiful Gardens." The Sandhills were "Deserts in the Rain;" old fields were "The Melting Pot;" and the high forests of our mountains were "Christmas Tree Land."

The Natural Gardens remains a superb introduction to the North Carolina landscape and is the easiest way to get in touch with the boundless energy of B. W. Wells. In his lifetime, however, Wells had a compulsion to share his growing knowledge with others directly. "One of the things you must understand about Wells," says Dr. Boyce, "was his long-time dedication to the education not only of his students but to older people across the state." For Wells, knowledge was not something to lock up in the university like a hothouse plant. As early as the 1920s, Wells was taking his show on the road, giving talks and lectures to garden clubs, schools and anyone else who would hear him. "He had a gift of saying things in an interesting way, with enthusiasm," says Dr. Troyer. "That's what would capture a stranger on first meeting him. His eyes would sparkle and he would be talking about something in such a way that his whole person would be involved in what he was saying." In primitive automobiles on primitive roads, Wells brought the word about North Carolina's natural wonders to countless school halls and unheated auditoriums in isolated villages and hamlets throughout the state. In one 10-year period, he gave over 100 talks, many illustrated with lantern slides.

"He loved North Carolina," says Maude Wells. "It was the love of his life, I think. He taught so many people to love North Carolina."

Wells was also a popular teacher. The most eagerly anticipated part of his ecology course at N.C. State was his field trip to the Coastal Plain where students learned about ecosystems directly. After spending the day teaching his students how to look at a sand dune or a longleaf pine stand, the group would repair to Carolina Beach and dance the night away. Photographs of him on one of these field trips show him looking unselfconsciously into the camera, sometimes barechested, a hint of a jaunty smile on his face. He was proud of his physique. He was not a tall man, but he was strong and wiry and possessed an astonishing physical vigor that remained with him late into his life. In his seventies and eighties, he would sometimes complain of younger companions who couldn't keep pace with him on frequent hikes to the top of Mt. Mitchell.

During his 35 years at N.C. State, Wells was involved in several controversies over interpretations of North Carolina plant communities. Some of his positions, although not immediately accepted, later became so — the limiting effect of salt spray on seaside plant communities, for example, and the human origins of mountain balds. About another, Carolina Bays, he is generally acknowledged to be wrong. He was convinced that the Bays — the strange shallow depressions that cover the Southeast — were formed by meteorites. The interpretation has been debated widely over the years and most researchers were and continue to be dubious about it. But Wells was convinced he was right and he argued it with tremendous energy late into his life. "He could be a dogmatic man and this became especially pronounced as he grew older," says Dr. Troyer. Troyer cites this dogmatism as one possible



reason why Wells has not received the recognition of others among the early American ecologists.

At the age of 70, having retired from the university at the mandatory age of 70, Wells and his wife moved to the riverbend farm along the Neuse River where he was to spend the final 24 years of his life. Not surprisingly, these were years of great vigor and accomplishment. He inventoried the plant life on his 154 acres, blazed trails throughout the woods and along the river where he loved to walk. Long interested in painting, Wells threw himself into his hobby now. He built a studio and laid the stone chimney himself. He produced over 300 paintings in these years, and gave most away.

Wells died in 1978 at the age of 94. He lived to see the nation become aware of the environment, a goal that he had spent his life pursuing. He also saw the state, through the efforts of the Natural Heritage Program and the N.C. Nature Conservancy, begin the task of inventorying and saving the important natural areas that were left. But the North Carolina that he had celebrated in *The Natural Gardens* had changed substantially since 1932. For 20 years he fought to preserve the Big Savannah, the shrub bog that had opened his eyes to the natural wonders of North Carolina, only to see it cultivated and destroyed by the early 1960s. It was only one of many conservation causes he championed. "He was angry all the time about what was happening to the state," says Maude Wells.

In the revised edition of *The Natural Gardens*, published in 1967, he saluted once more the vanished savannah of his youth. Quoting the president of a national conservation organization, he offered these words to encourage another generation of conservationists. "The Big Savannah near Burgaw is now gone and nothing can bring it back. Let us at least salvage from this disaster the determination to find several next best savannahs and see that they are given protection in time." ⊠

***At his retirement** home in Wake County, Wells painted Zeagle's Rock (facing page), a prominent landmark on the Neuse River. Although the Coastal Plain remained his great love, Wells was fascinated by mountain balds (below). Goldenrod grows in a Carolina Bay (bottom).*

CURTIS WOOTEN

LAWRENCE S. EARLEY

TOP DOG

With these training tips from John Weller, your retriever puppy could turn out to be a real winner. Even so, Moses Of Antioch will be a tough act to follow.

By Eddie Nickens

Photographed by Ken Taylor

Hard to believe, but it's a hot day in March. Hunting season is two months gone and six months away, but still John Weller is wearing camouflage. There's a horizontal tan line across his forehead, proof of hours spent under a hunting cap. A hundred yards away, the black form of a dog bobs against the brown line of a distant field edge, and I can tell that Moses has lost the bird. The black Labrador retriever false starts to the right, but only for a step. Weller blows a single short whistle blast and Moses, a football field away, wheels and sits, staring back, waiting with a student's attention.

Jeez! I think. Not many 12-year-olds mind their parents so quickly. Weller holds his right arm up. "Back!" he yells. Moses wheels to the right, dashes forward a dozen steps and pulls the dummy from a hummock of weeds. Thirty seconds later he delivers the white plastic cylinder to Weller's hand. Like clockwork, I say, but Moses and his trainer take it all in stride.

"That's nothing," Weller says. "He'll sit from 300 yards away."

***Moses of Antioch** poses for a fittingly regal portrait as though he were fully aware of his stature among his peers. Over the past two years, Moses has amassed more field trial points than any other retriever in the country.*

Like all retrievers, Weller's Moses of Antioch has a knack for finding and bringing objects to his master. But for two years running, this North Carolina bred and born retriever has amassed more points on the North American Hunting Retriever Association (NAHRA) field test circuit than any other dog on the continent, a feat that places Moses at or near the top on anyone's list of the finest hunting retrievers in the land.

Unlike many other formal dog associations, the NAHRA refuses to bestow national or grand champion stature to any one particular dog. Competitions are structured so that dogs compete against written standards instead of one against the other. When a dog passes 80 percent of the required tests, it moves to a higher level of competition. NAHRA field tests are specifically designed to query a hunting dog's ability to handle tasks that parallel conditions in the field. Camouflage clothing is worn, duck calls are blown, guns are shot. If one dog has a rare medal-winning performance while another has a bad day, penalties aren't recorded. The dog may excel at the next tests. Such competitions, according to NAHRA philosophy, are a more accurate assessment of a hunting retriever's overall ability than a contest in which dog competes against dog. But the lack of a blue-ribbon ceremony doesn't mean the best of the NAHRA dogs can't compete. Rest assured that any dog reaching the top of the NAHRA circuit is of champion stature.

And rest assured as well that the training techniques that put Moses on the 1987 and 1988 Alpo-NAHRA All-American Team (and a qualifier for the 1989 team trials in April) can help any new dog owner get started on the right paw — or hone the skills of a dog that already brings back the bird. While Weller makes a living as a professional dog trainer, many of the techniques he employs can be duplicated at home, if the dog owner has the time and patience.

"It's all fundamentals," Weller says, as Moses paws at pigeons in a cage on Weller's training grounds outside of New Bern. "There's no secret to it. You just work the dogs — do what you want them to do, over and over. You teach them that it's fun, that it's a game. You con them into it. They don't know that they're learning. Then, when the water is cold, they don't know that it's *not* a game."

With that, Weller releases a pigeon over a small pothole dug into an open field. Ditches and canals weave between hillocks of bulldozed dirt; a duck blind guards one corner of the slough. The bird folds at the crack of Weller's gun, and at "Back, Moses!" the dog leaps through shallow water before settling into a powerful swim. When he brings the bird to Weller, the trainer slaps his thigh softly. "Heel, Moses." Slap-slap. "Sit." Slap-slap. "Shake." And the dog shakes while sitting. "I won't let him get my pants wet," Weller explains.

Weller feels strongly that obedience training and retrieving be implemented separately until the dog can obey simple obedience commands and complete retrieves eight out of 10 times. Only then should the two disciplines come together, he says.

"I don't like to have my dogs sit and stay for a retrieve until they're about nine or ten months old," he says. Moses pads aimlessly about, freezing for a moment, head up, when a lone mourning dove darts across the field. Not only do separate training sessions allow the dog to act on natural retrieving instincts while still too young to understand discipline, but the application of discipline during early retrieving training can have unwanted side effects.

"He's got something in his mouth and you're getting on him; he doesn't understand the difference," Weller says. "Sometimes that makes the dog not want to retrieve anymore. I feel that you should build the desire to retrieve while the dog is

***John Weller** puts Moses through his paces during a practice drill. It doesn't take long practice sessions to train a dog; shorter sessions held regularly are more effective. "End with success every day," says Weller.*

Moses retrieves a pigeon from a small pothole dug on John Weller's training grounds. When first teaching a dog to retrieve in water, Weller will go into the water with the dog.

taught basic obedience commands — sit and stay, come, heel, no — separately."

To build that desire, Weller starts training when the dogs are still very young. At 10 weeks, he says, a dog owner can start the dog on basic retrieving training — but limit the activity to only two or three retrieves a day. Quality time matters more than quantity; According to Weller, 10 to 20 minutes a day may be all it takes. During training Moses never retrieves more than seven or eight times, Weller explains, but each exercise is designed to teach a specific skill or solve a particular problem.

"Lie down on the ground or on the floor," Weller says. "Get eye level with the dog. If you have a little puppy, put him in a hallway. That's a confined area. Take a ball — a white ball, since dogs are color-blind and white contrasts with anything — and bounce that ball down the hallway and the dog will run after it. Then clap your hands and back away. A lot of people run at the dog, but you should back away from him and he'll start running to you.

"If you do this two or three times and on the third time the dog runs away and tries to play with the ball, you know that today you tried one time too many. Tomorrow just do two successful retrieves, and end with success every day. That's the key."

And that's a crucial point to all Weller training techniques: end with success. Each training exercise should be planned so that failure is a remote possibility, Weller says. You don't teach the dog to bring the bird back. You teach him not to consider coming back without the brid.

"Remember, no failures," he says. "Never fail. That's what I did with Moses from the start. I said I was going to teach this dog not to fail, not to fail, not to fail. You see, Moses doesn't even know what it means to come back without the bird."

By now Weller and Moses have moved to the edge of a field, weeds and brush waist-high. Weller releases a pigeon and fires twice. Moses prances forward a step or two at the shot, like a racehorse at the gate. Step-step. But Weller misses the bird and the pigeon flies unharmed. Step-step. "Mark the bird, Moses," Weller says. Step-step. "Free bird." Step-step. Ears rigid, the dog never takes his eyes off the bird, which soon wings over a distant treeline. "I didn't get him boy," Weller says apologetically. "No bird."

But Weller puts down the next bird and

***John Weller** believes the most successful trainers develop exercises that are virtually foolproof so that the dog rarely, if ever, experiences failure. "Moses doesn't even know what it means to come back without the bird," he says.*

Moses of Antioch is leaping through the brush. At each whistle blast he turns, criss-crossing the field in a path 10 yards wide, running as if through an invisible maze, until he finds the pigeon and bounds back. Just like clockwork.

"Retrieving is the icing on the cake," Weller says. "It's supposed to be fun for the dogs and you shouldn't have any problems. You shouldn't have to holler at your dog because he's running away. If your dog knows how to come, you won't have those problems, and you can advance in your retrieving."

But the dog owner also should be improving his capability to relate to the dog and his understanding of how training works. "Every time you whip the dog," Weller says, "you need to whip yourself two times, because you didn't train him right."

To gauge a dog's readiness to begin retrieving on command, Weller employs again his "eight out of 10" philosophy. When his dogs can meet that criteria on a single retrieve at 100 yards, then it's time to put obedience and retrieving together. For that, Weller has developed an interesting strategy.

"Make your dog sit and stay, then throw the bird into a body of water," he explains, grinning at what he's about to say. "The dummy is visible in the water; the dog won't fail because he sees it.

"Now, that dog should sit and stay. If he breaks and goes into the river, *you* go into the river after him. Yell at him. 'No, no, no. What are you doing?!' You've kept your obedience training separate, so he should know what 'no' means. Then you bring him back. Sit and stay. If he breaks, you get wet again."

***Everyone who** has ever owned and trained a sporting dog knows the special bond that develops. Certainly it's more than just master and student — maybe you call it love.*

Weller says the Indians used to break horses in the water because the current kept them under closer control. "The horses couldn't buck in the water, and it's the same thing with a dog," he explains. "In the water he'll come back to you straighter, and he'll see the bird, so he's not going to fail. Find a little cove, somewhere with a lot of bushes, and the dog will have to come back to you."

But dog owners know that a dog doesn't ever *have* to do anything — or so they think. If patience is a virtue for most people, it's a requirement for dog owners. Weller beats on a set of drums when frustration mounts over his dogs, and with as many as 15 under his care at one time, the drum skins show signs of pounding. Still, Weller says, by following his suggestions the patient amateur trainer should be able to produce a field companion by next hunting season.

"You get an eight-week-old dog in February, he ought to be able to do a little retrieving in the next season. Single retrieves, maybe," Weller says. "That shouldn't be a problem for the average man, but you can't go out in the back yard and do all this in one day. You can forget it. The dog has to learn it by repetition."

Some dogs may have even advanced to more complicated skills — hand signals or "overs" — but Weller stresses not to try too much in the field that first outing. "Dogs need a lot of birds," he says. "Game makes the dog. So don't worry about your buddy's dog that can already do this or that. He and his dog are going to get burned out soon because they've spent too much time doing other things. *He's* going to be the one over there in the duck blind throwing his whistle, hollering, calling his dog a crazy fool. *Your* dog will always have the fire to go. He won't be burned out and he's learned the right way. He's smooth, quiet and deadly."

It's like building a fire, Weller says, using his favorite analogy. "Try to make your dog love the bird," Weller says. "Then take it away. Sometimes when Moses does something right, I quit. I put him in the truck and go somewhere else. Make him want it. It'll build up like a stick of dynamite, then you can't keep him from the bird.

"So you've got that stick of dynamite and you're steadily adding to it, and then one day it's going to blow up. And when it does, man, you've got a dog. And the next year he's going to whoop your buddy's dog all to pieces."

Transplanted To Abrams Creek

Threatened Fish Booms In Little Tennessee River

Written and Edited by Mark Taylor

The summer of 1986 was bone dry, and the Little Tennessee River ran clear and low. John Alderman, a nongame biologist with the Wildlife Commission, wasn't expecting much as he and other biologists walked down to the river with their seine. Alderman specializes in aquatic species,and was surveying the aquatic life of the Little Tennessee's drainage.

"We seined at two sites on the Little T that day, and found 82 spotfin chub," he recalled. "It was unbelievable."

The small, silvery fish that the biologists netted is one of the rarest in the Southeast, and is found in only a handful of rivers in North Carolina, Tennessee and Virginia. In North Carolina, the range of this threatened species is restricted to the portion of the Little Tennessee River below Franklin. The fish is so rare that only 32 specimens were found in 42 collecting trips taken on the river between 1947 and 1985, and no more than eight fish were ever found at a single site.

What accounted for the sudden increase? Alderman notes that spotfin chub may have evolved when the climate was warmer and drier. The drought produced these conditions, and also reduced siltation in the Little Tennessee River to its lowest level in years. This apparently allowed the spotfin chub to experience unusually high spawning and reproductive success.

"Spotfin chub are fractional spawners, which means that they may spawn several times from late May through August," he said. "When conditions are right, their populations can really take off."

That is precisely what Alderman and other biologists hoped for, and exactly what happened. Since the spotfin chub is found in only a small portion of the river, it could easily be wiped out by a spill of toxic materials, heavy sedimentation, or a change in the river's environment. Consequently, Alderman and biologists from the U.S. Fish and Wildlife Service and Great Smoky Mountains National Park began planning a reintroduction project. Spotfin chub from the Little Tennessee River would be collected and released in Abrams Creek in the Great Smoky Mountains National Park where they would be protected from siltation and could serve as a source for future reintroductions.

"Spotfin chub are native to Abrams Creek, but were lost in the 1950s," said Alderman. "However, we examined the habitat and felt it would support them. The Park Service was excited about this project because it would restore a native species to the park. It's also a good idea to have a second source of native fish in case anything happens to the population in the Little Tennessee River.

"First, however, we needed to be sure that our reintroduction effort wouldn't hurt the existing population. Dr. Bill McLarney received one of the small grants from the nongame program to study the reproduction of the spotfin chub, and surveyed the Little Tennessee River frequently. The dry summers continued, and while that was bad for farmers, it was good for the spotfin chub. Siltation remained low, and spotfin chub populations soared."

The reintroduction took place last October when 10 biologists and volunteers caught and moved 250 spotfin chub from the Little Tennessee River to Abrams Creek.

"Spotfin were so numerous that they had become one of the dominant fish in the river," said Alderman. "We completed the work in about four hours, and the fish seem to be doing well. If normal rainfall patterns return, spotfin populations in the Little Tennessee River will probably decline. However, we plan to continue this restoration effort for four years if possible."

KEN TAYLOR

Moving Party: *Biologists and volunteers recently caught 250 threatened spotfin chub in the Little Tennessee River, and reintroduced them to Abrams Creek in the Great Smoky Mountains National Park. This will provide a second population of native fish if anything happens to the spotfin chub in the Little Tennessee River.*

This project was one of many supported by the North Carolina Nongame and Endangered Wildlife Fund. Readers may support this fund by making a tax-deductible contribution through a checkoff on their state income tax returns, or may send contributions directly to the N.C. Nongame and Endangered Wildlife Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Unique Program Promotes Conservation

Sundrops Named Wildflower Of The Year

Interested in saving wildflowers? If so, be sure to participate in the Wildflower of the Year program sponsored by the North Carolina Botanical Garden and the Garden Club of North Carolina.

"The purpose of the program is to promote the conservation of wildflowers by featuring a special wildflower that is easily cultivated," said Rob Gardner of the Botanical Garden. "Many people collect wildflowers in the wild. Some of these flowers are very rare, however, and we're encouraging people to acquire wildflowers through more ethical means—either from reputable nurseries, or by propagating plants at home. Even when wildflowers are purchased from a nursery, you should ask about their source. Some nurseries still collect plants from the wild."

The 1989 Wildlflower of the Year is the sundrops. This flower grows up to 2 feet tall, and has large clusters of bright-yellow flowers along its stem. Flowering generally begins in mid-May in the Piedmont, and continues for several weeks.

Sundrops is a perennial, and is easily propagated by seed or division. It is also an excellent flower for cultivation, and is often planted in borders. It should be planted in a sunny site with well-drained soils.

A free package of sundrop seeds and information on their cultivation may be obtained from the Botanical Garden. Send a stamped, self-addressed business-sized envelope to Wildflower of the Year, N.C. Botanical Garden, Campus Box 3375, Totten Center-UNC, Chapel Hill, N.C. 27599.

Field Notes

Season openings, closings and regulation changes:

Rabbit	Closes Feb. 28
Quail	Closes Feb. 28
Grouse	Closes Feb. 28
Eastern raccoon season	Closes Feb. 28
Common snipe	Closes Feb. 28

Public hearings for the 1989-90 hunting, trapping and fishing regulations. All hearings begin at 7 p.m., and the schedule is as follows:

Date	District	Location
Feb. 6	2	Craven County Courthouse in New Bern
Feb. 7	1	Old Chowan County Courthouse in Edenton
Feb. 8	3	Nash County Courthouse in Nashville
Feb. 9	4	Bladen County Courthouse in Elizabethtown
Feb. 10	5	Alamance County Courthouse in Graham
Feb. 13	6	North Stanly High School in Albemarle
Feb. 14	8	Civic Center Auditorium in Morganton
Feb. 15	9	Cherokee County Courthouse in Murphy
Feb. 16	7	Elkin High School in Elkin

Located Off Masonboro Inlet

Dredge Sunk As Artificial Reef

BUD DAVIS

Still Serving: *The U.S. Army Corps of Engineers dredge* Hyde *was recently sunk by a Marine Corps demolition team approximately 25 miles southeast of Masonboro Inlet as the state's newest artificial reef. The artificial reef program is conducted by the N.C. Division of Marine Fisheries. Biologists have found that these wrecks quickly become encrusted with marine life and teem with baitfish. This attracts sea bass, snapper, bluefish, king mackerel and other game fish which, in turn, attract fishermen.*

The Hyde *has a proud history, and is the only Corps ship to have circled the globe. The 215-foot dredge was commissioned during World War II, and also served in the Korean and Vietnam wars before being donated to the artificial reef program in 1987.*

Idled Land Provides Habitat

Conservation Reserve Program Helps Wildlife

Wildlife faces a better future on over 104,000 acres of farm land in North Carolina. That's the amount of crop land that has been placed in the U.S. Department of Agriculture's Conservation Reserve program, which was established under the 1985 Farm Bill.

The purpose of the conservation reserve program is twofold: to take highly erodible farmland out of production, reducing soil erosion and siltation of our waters, and to reduce crop surpluses.

Only lands which are classified as highly erodible are eligible for the program, and these must have been planted in row crops at least twice between 1981 and 1985 and be currently suitable for planting. The program places these lands in a permanent vegetative cover which will reduce soil erosion and provide habitat for wildlife. Cost-sharing provisions in the program allow farmers to receive up to one-half of the cost of establishing this permanent cover (up to a maximum of $50 per acre) and annual rent for each erodible acre of land retired. In addition, cost sharing is available for establishing filter strips to reduce erosion along rivers, streams and other waters. Farmers who enroll in the program, however, must maintain these lands in a permanent vegetative cover for at least 10 years, or they will lose price and income support administered by the Department of Agriculture.

Many North Carolina landowners are opting to plant trees on their conservation reserve lands. In fact, 56,000 acres have been planted in pine forests.

"The Conservation Reserve Program offers great benefits to wildlife, especially small game," said Terry Sharpe, small-game project leader for the Wildlife Commission. "Landowners who plant trees, however, should use a wider spacing to obtain the best wildlife habitat. This allows sunlight to reach the ground and stimulate the growth of smaller native plants which provide food and cover for quail, rabbits and many songbirds and other small animals. Landowners who are interested in managing wildlife on these lands should contact their district wildlife biologist."

Information on the Conservation Reserve Program is available through county offices of the U.S. Agricultural Stabilization and Conservation Service. For the name and address of your district wildlife biologist, call the Wildlife Commission's toll-free Wildlife Watch Hotline at 1-800-662-7137.

—Angela Hill

Virginia Trout Streams Hurt By Acid Rain

Acid rain damage may be closer than you think. In fact, studies done in Virginia show that some trout streams are already suffering from acidification.

The Virginia Trout Stream Sensitivity Study began in 1987, and 350 streams have been analyzed for acidity and other water quality data. The study found that 78 percent of the streams are sensitive to acidification, and 50 percent are extremely vulnerable.

Even more disturbing, however, was the finding that 11 percent of the streams are currently acidic. These waters offer only marginal habitat for trout and other fish.

Funded By Trout Unlimited

Trout Featured In Display

TOM EARNHARDT

Focus On Fish: *The Triangle Flyfishers Chapter of Trout Unlimited in Raleigh recently donated $2,500 to the N.C. Museum of Natural Sciences for construction of an aquarium featuring cold-water fish, such as trout, and their habitat. Here, Robert Graham (center), treasurer of the chapter, presents the donation to Dr. John Funderburg (left), museum director, and Frank Radovsky, curator of research and collections.*

The 1989 North Carolina Wildlife Calendars Are Here!

Please send me ..... N.C. Wildlife Calendars at $6.00 each $_____

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For fund raising and bulk rate information (10 calendars or more), call 919-733-7380. Please allow 4-6 weeks for delivery.

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CALO89

Calendar Of Events

On several occasions, events in this calendar have been changed or canceled without notice. Readers should check with the contact listed before traveling to an event.

Feb. 1-3
Southern Farm Show at the North Carolina State Fairgrounds in Raleigh. For more information contact David J. Zimmerman, P.O. Box 36859, Charlotte, N.C. 28236 or call 704-376-6594.

Feb. 1-5
Mid-Atlantic Boat Show at the Charlotte Convention Center in Charlotte. Features boats, fishing, water sports. For more information contact Southeast Productions, P.O. Box 7282, Greensboro, N.C. 27417 or call 919-855-0208.

Feb. 15-19
Carolina Power and Sailboat Show at the North Carolina State Fairgrounds in Raleigh. Large display of power, fishing and sailboats. More information available from Southeast Productions (same address and tel. as above).

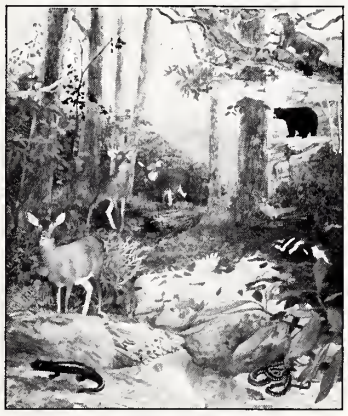
Feb. 25-26
213th Anniversary of the Battle of Moores Creek Bridge at the Moores Creek National Battlefield in Currie. Living history encampment, musket demonstrations, and other activities. For more information contact Dana Smith, P.O. Box 69, Currie, N.C. 28435 or call 919-283-5591.

New Nongame Print Offered

"Forest Life of the High Peaks," the 1988/1989 Nongame and Endangered Wildlife Print, is now available. "Bottomland Hardwood Forests" (featured below, right) is also available for sale.

Proceeds from the sale of these full-color prints will be placed in the Nongame and Endangered Wildlife Fund which supports a variety of nongame wildlife projects and the purchase of wildlife habitat in North Carolina. Each poster-sized, numbered print bears artist David William's signature.

Order information is available on page 33.



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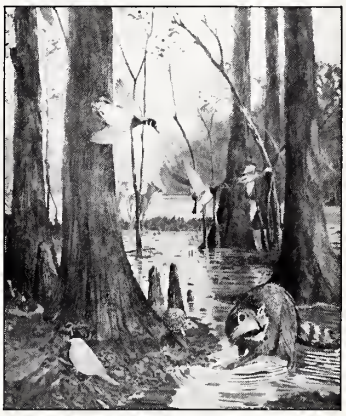


1987/1988

Trophy Bucks Featured At Dixie Classic

Late winter is a slow time, but Tar Heel sportsmen have something to look forward to — the ninth annual Dixie Deer Classic. This year's classic will be held from March 3-5 in the Jim Graham Building at the North Carolina State Fairgrounds in Raleigh.

The classic, sponsored by the Wake County Wildlife Club, will feature a large display of trophy deer heads, seminars on deer hunting and management, and the latest in hunting equipment.

Hunters may also bring trophy deer heads for scoring. For more information contact the Dixie Ceer Classic, P.O. Box 12202, Raleigh, N.C. 27605.

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on November 30, 1988

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	45,598	$15,481,328.24
Lifetime Hunting License	410	107,375.84
Lifetime Fishing License	3,490	705,737.78
Lifetime Subscriptions to Wildlife in N.C.	1,480	194,417.09
Contributions	—	135,300.19
Fund Total	50,978	$16,624,159.14
Total Interest Earned	$3,596,289.92	

Our 50th-anniversary book — *Wildlife in North Carolina* — is a gift for all seasons!

It doesn't have to be Christmas to give a book that will delight and inform. From 50 years of *Wildlife in North Carolina* magazine comes this big hard-cover book, packed with wildlife art, color photographs and great outdoor writing.

Readers say:

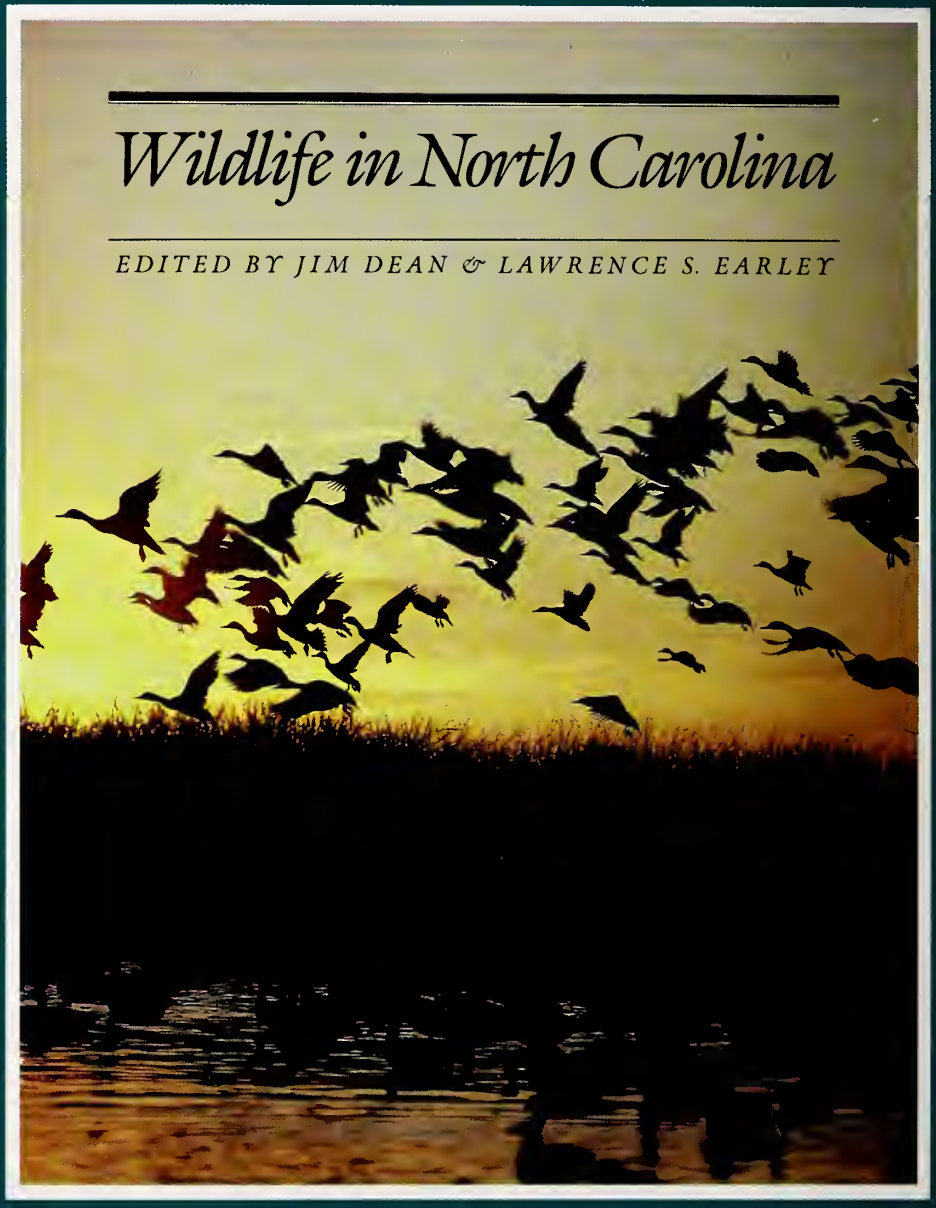
"This attractive book is probably intended for the sports or outdoors person; but in fact it should appeal to anyone with an active interest in our state's history, natural or otherwise."

—*Michael McFee*, The Spectator

"It is not only for the sportsman in the family but for all the family and an excellent book to send both to Tar Heels who have moved away and to folks who have just moved into North Carolina."

—*Bugs Barringer*
Raleigh News and Observer

Published by the N.C. Wildlife Resources Commission and the University of North Carolina Press. Hardbound copy is $24.95 at bookstores everywhere. Or order direct using the special order form below.



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The money you give to help restore the peregrine falcon also helps the spiny mussel, green sea turtle, bald eagle and many other nongame species. (Contribution form page 33)

After The Fog

Soft winter light bathes this mountaintop tree, a stark contrast to the dense fog and bitter cold that earlier wrapped it in its coat of rime.

LITHOGRAPHY BY EDWARDS & BROUGHTON COMPANY, RALEIGH, NORTH CAROLINA

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WILDLIFE IN NORTH CAROLINA

MARCH, 1989 75 CENTS

Modern Tackle Gives The Edge

by Jim Dean

For the last few years, I've been trying to catch largemouth bass the same way the government solves problems —by throwing money at them. It strikes me that I'm not the only fisherman who uses this tactic to improve his angling success, and especially this time of year.

You can identify those of us poised at the front end of another angling season simply by the fluid nature of our cash flow. It's still a bit early to do much actual fishing, so we vent our energy in a buying frenzy, and we can translate the slightest whim into a purchase. Witness the small drama I saw played out in a tackle shop last March.

JIM DEAN

Two men were looking at a massive display of fishing lures that stretched from floor to ceiling along the entire wall of the shop.

"Fellow I know says the son of a friend of his caught a bass on one of these once," said one fisherman, showing one of the lures to his companion.

"Really?" said the second fisherman. "Big one?"

"He didn't say," said the first. "Dang lure costs nearly $6, though. Isn't that outrageous?"

"Sure is," agreed his buddy.

Yet despite what seemed to be tacit agreement that the lure was not worth buying based on such flimsy hearsay, each angler carried one to the checkout counter. Whereupon, I guess I ought to add, they watched me come along behind and buy one just like it.

"Hey, look at that," the first angler whispered as he nudged his companion. "He's got one, too. Must be a hot lure all right."

I realize this makes us all appear rather foolish, and rather than risk a more damaging assessment, maybe we ought to simply acknowledge that we are foolish. It's just that while bass fishermen may agree you can't buy happiness, we are dead certain you can buy hope.

Perhaps the most amazing thing about these spending frenzies is that they sometimes work. Therefore, if you're looking for a reason to buy a new rod, reel, lures or other gear, listen up.

Until about 10 years ago, I seldom had any extra money for fishing tackle, and most of what I owned had either been inherited or given at Christmas or birthdays. Having no choice, I made do, and caught fish. But friends of mine who were better equipped caught more bass then I did. I figured they were simply better fishermen, and I'm sure that was often true.

Finally, it dawned on me that part of my livelihood depended upon a more thorough knowledge of modern tackle and techniques (how's that for a rationalization?). Over the next few years, as funds permitted, I began to replace my ancient gear with the most modern rods, reels and other gear I could afford.

Have I caught more fish? As a matter of fact, with some notable exceptions, I have. Up until a decade ago, you could use your father's tackle without sacrificing much, but no longer. Tackle manufacturers have made astonishing strides in both quality and innovation, and this is particularly true of bass tackle. If you're determined to catch bass under today's competitive conditions, you are handicapping yourself if you don't update your gear.

The first place to start is with rods and reels. There are still some good new glass rods available, and some older glass rods remain serviceable, but if you're going to buy a new rod, by all means try graphite. Such rods are, in my opinion, superior. So are the new casting and spinning reels, and even those of moderate cost are durable, likely to cast better, and have much smoother drags.

If you're still using your grandfather's lures, and enjoy doing so, that's fine. Some of them are still good producers, but most modern bass lures generally work better because each type is designed for a fairly specific purpose. Today, an adequately equipped bass fisherman will have soft plastic worms and lizards, pigs 'n jigs and deep-running, sinking lures that can probe the bottom even in heavy cover. Floating-diving crankbaits that fish various depths along steep banks or dropoffs comprise another essential category.

Clothespin spinner baits with blades are another versatile type, and can be fished in heavy shallow cover, bounced down steep banks or retrieved slowly along the bottom in deeper water.

For suspended bass in open water, jigging spoons, slider jigs and a selection of sonic-style baits that rattle will catch fish when other lures fail. Shallow-running, floating-diving minnow imitations and a variety of surface lures, including the newer buzz baits, will round out the basic catergories.

Some of the new lures are merely color and size variations on older styles, but many are significantly different, and you should try to get at least one or two of each catergory. Without a versatile range of types, there will too many days when you won't have the right lure for the conditions.

See you at the tackle shop. You'll know me by the crazed gleam in my eye.

March, 1989
Volume 53, Number 3

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *Jodie is ready for ducks. Tomorrow, it may be bobwhites, doves or something else because versatility is one of the Boykin spaniel's best assets. Photograph by Mike Gaddis.*

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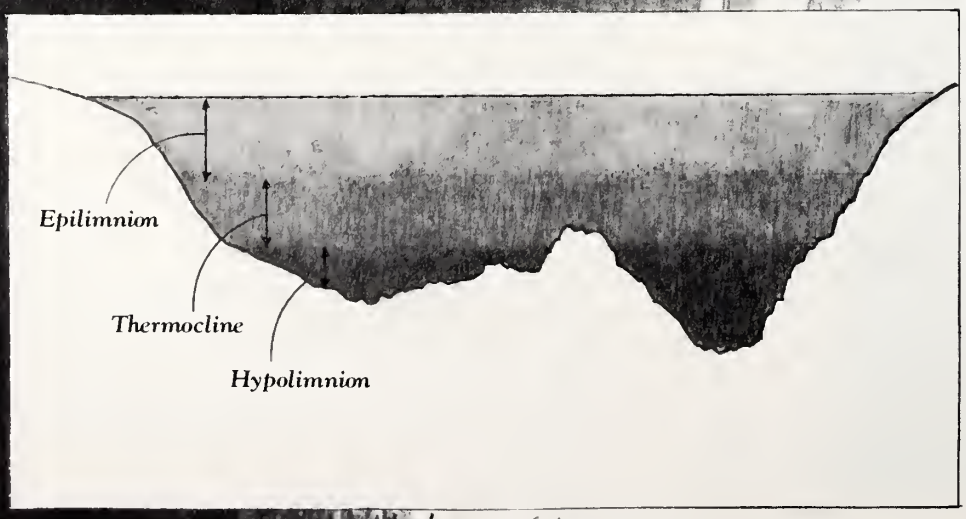


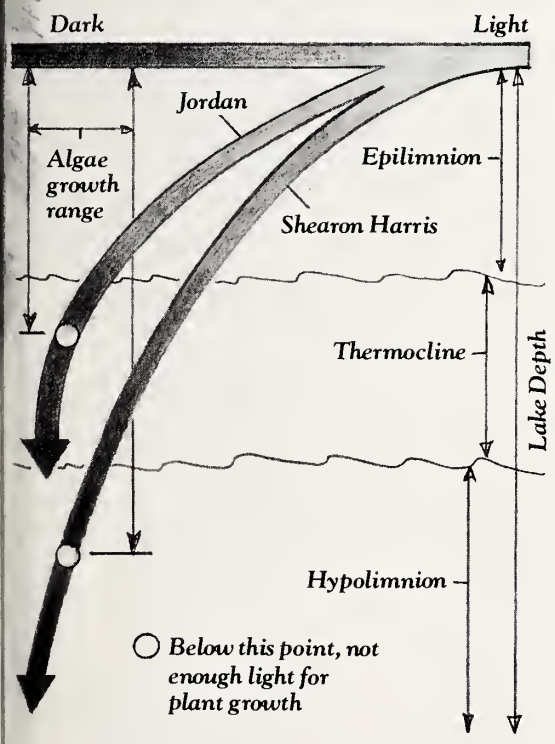
In late spring *and summer, deep lakes will divide into three zones separated by differences in temperature. On the surface is a shallow layer of warmer water called the epilimnion. On the bottom lies the hypolimnion, a layer of cooler water that varies in depth depending on the lake. In between these two layers is the thermocline, a zone of varying temperature depending on depth.*

D Williams

Layers in the Lake

written by Lawrence S. Earley / illustrated by David Williams

Striped bass, *like many other fish, are sensitive to temperature and oxygen levels in lakes. In summer, when lakes stratify into zones of different temperature and oxygen levels, stripers seek the cooler water deeper in the lake. But often, the deeper layers have less oxygen. Fish kills are common results.*



Graph shows *how lake turbidity can affect living conditions for fish. Jordan Lake carries a lot of sediment which reduces light penetration and restricts the growth of oxygen-producing plants. In a relatively clear lake such as Shearon Harris, light penetrates deeper and supports more plants. Shearon Harris's fish will thus experience less stress in summer because plants will bring oxygen deeper, while in Jordan oxygen will often be exhausted in the cooler, deeper zones.*

Something's beginning to happen in many of our deep lakes about now. It's so subtle and quiet you won't be able to observe it, yet it's hard to imagine the dramatic effect it has on fish.

What we're talking about is the tendency of some of North Carolina's deeper lakes to divide into zones of differing temperatures and oxygen content. Most lakes emerging from winter generally have a uniform temperature from top to bottom. But as the weather warms, the sun heats the lake surface so that the first few feet may be several degrees warmer than the deeper water. The warmer water, less dense than cooler water, will float on top of the cooler water below.

In effect, by summer the lake will be divided into distinct zones very much like a layer cake. The upper layer, which biologists call the *epilimnion*, consists of warmer water that mixes continuously and thus has a fairly uniform temperature. The lowest layer, called the *hypolimnion*, is colder, darker, denser and at certain times contains little oxygen. Separating these two layers of uniform temperature is a transitional zone called the *thermocline* where the temperature and oxygen level vary according to depth.

Deep lakes remain stratified in this way throughout the summer. In the fall, however, the lake surface begins to cool until it is the same temperature as the bottom layer. As the density difference between the layers is reduced, resistance to mixing disappears and the lake water readily circulates. It continues to circulate throughout the winter until it stratifies once again in spring.

How does this affect fish? Well, it depends on the lake and also on the fish species. For example, biologists know that striped bass can be stocked in Lake Norman, but are more borderline in Lake Jordan. Both lakes stratify, but Jordan is shallower and the water is so rich in nutrients that is produces a lot of algae. It's eutrophic, in other words. The algae will eventually die and fall to the bottom to decay, a process that consumers oxygen. No new oxygen is being introduced because of the barriers between upper and lower levels, and also because turbidity — a problem in Lake Jordan — prevents light from growing oxygen-producing plants in the lowest zone. In time the decaying vegetation may deplete the oxygen levels in the lowest level of the lake.

That spells trouble for striped bass. Stripers require cool, oxygenated water and so in summer they want to go deeper, to the cool water. In Lake Norman they can find the cool, oxygenated water they require. But in Lake Jordan, the cooler water suffers from low oxygen levels and so the fish are stressed. The same is true of other fish.

Hybrid bass (from stripers and white bass), on the other hand, are more tolerant of both warm water and low oxygen and so they do quite well in Lake Jordan.

The stratification of lakes into zones of different temperature and oxygen is one reason fish kills often occur during late summer. But in the fall, the lake will mix as the surface temperature cools and fresh oxygen will be brought to the depths once more.

DOGS THAT DO IT ALL

If you're limited to one dog, and like variety in your hunting, consider a spaniel. Great things do come in small packages.

by Mike Gaddis

MIKE GADDIS

***Good days** afield are recalled in a photo of a couple of hunting buddies and memorabilia familiar to most dog trainers and hunters.*

Chance, as his name suggests, came my way by happenstance. Rescued from a harsher fate by a friend, he was black-on-white rip-rap, and came not to care. He offered his friendship unconditionally, as only a dog can. Who was I to turn aside honest intentions?

He came at a time I had many irons in the fire and the bit in my teeth. There wasn't much we didn't get to. Fur or feathers, it made our want list.

Despite the varied training regimen into which he was inducted, Chance emerged a quick and able study. By the time he was three, his credits were rather impressive. He was respectable at treeing squirrels and an occasional possum, could start and bring a cottontail around, was a crack dove retriever, would gather up a duck or goose, and was no slouch at finding and pointing "pottiges".

In a word, he was "versatile."

Versatility in a field dog is a highly desirable quality for those who by inclination or circumstance limit themselves to one canine companion, but enjoy variety in their hunting. A versatile dog might be practically defined as one that finds and points or flushes for the gun upland game such as quail, grouse, or pheasant, is well suited to the rigors of retrieving waterfowl, and can do at least a respectable job of bringing furred game such as rabbit and squirrel to bag.

With this in mind, the search for the ultimate versatile breed has been intense. Dogs like Chance to the contrary, certain breeds exhibit a combination of performance, disposition, conformation, and coat characteristics best matched to versatile applications.

Judging by stud book registrations with the American Kennel Club and American Field Stud Book, and proven field performance, the versatile breeds which have emerged as most popular combine keen hunting desire, perpetual animation, compact body size, and an exceptional desire for human companionship. Easily kenneled in small quarters, as much at home on the hearth as in the field, they fill the bill as well as possible for the one-dog hunter.

These traits approach perfection in the spaniels.

The word "spaniel" is likely a distortion of "Espanol." Canine geneology traces the basic stock of all pointers, setters, and spaniels to Spain. From there the migration route was to France, the British Isles, and America, with the greatest development of all three strains taking place in the British Isles. The spaniel family is large. There are eight different varieties based upon field utility, encompassing a number of individual breeds, some well known, others exotic. In the United States, the cocker, springer, and Brittany are the most popular, the field spaniel the most rare, the Irish water spaniel the tallest, and the Clumber the heaviest. The cocker, in fact, led all AKC registrations for calendar year 1987, with 105,236 dogs being recorded. The majority of these, however, were not owned for sporting purposes, but for show and companionship. In contrast, a much greater percentage of springers and Brittanys are registered to hunters.

It was once different with the cocker. There are still among us those who have a fond memory of a day afield with one of these happy little dogs, where the bag at sunset was heavy with a mixed blessing of quail, dove, duck, jacksnipe, squirrel, and

***Of the various** breeds of spaniels, the Boykin is the least known. Yet, its popularity as a good companion and versatile hunting dog is growing. Despite relatively small size, Jodie retrieved this pair of wood ducks with characteristic enthusiasm.*

SAMMY GIDDENS

***Three generations** of Brittany spaniels go through a training session with Sammy and Nida Giddens of Raleigh. Sadie (in the background held by Nida) is daughter of Pete (held by Sammy), while the grand patriarch, Buck, is in the foreground.*

rabbit. Indeed, the cocker was first a versatile field dog, and a good one. There are still a few field cockers around, maintained with a recurring infusion of blood from the British Isles. It may come as some surprise that a national championship field trial for cocker spaniels was held as late as 1960 in Missouri.

The spaniel's roots rest deep in antiquity. An old Welsh law of AD 300 mentions "our native spaniel." Also, from the laws of Howel Ada, a tenth-century Welsh ruler: "There are three higher species of dog; the tracker, the greyhound, and the spaniel". It was then explained that a spaniel was held in equal esteem with a stallion or the King's buckhound.

Three predominant traits win overwhelming honors for the spaniels: unparalleled hunting instincts, unbounded enthusiasm, and unrelenting devotion. Their incomparable animation, abetted by size and agility, distinguishes them among all sporting breeds. A spaniel puppy arrives as a perpetual synapse of nervous energy. With nurturing and training, this is exhibited in the finished field dog as a ceaseless hastening from here to there, forever exhuberant, with snap and verve. This most characteristic manner has been aptly described as "merry bustle." It takes a cynical man to spend a day with a spaniel and fail to recognize that there is happiness in the world.

In truth, most hunting spaniels are underutilized. Southern hunters use their spaniels mainly as retrievers of dove and waterfowl, shot in passing or over decoys. Others are used to find and point quail, woodcock, or grouse. The flushing spaniels are given little opportunity at upland birds, and are only rarely used for furred quarry. The English pointer and setter have been so prominent in our field upbringing in the South that we tend to think of upland birds being pointed rather than flushed. For squirrels, we think fice; for rabbits, beagles. Anyone who hunts a variety of game over a fully finished flushing spaniel will find that it fills the role with aplomb.

In fairness to both dog and owner, it should be realized that the training of a versatile dog takes many hours on a variety of game. It can be done by an experienced amateur trainer, or by an amateur who is willing to devote the hours and work, and has the patience to stick to a training plan. There are good training books available. However, unless you have done a good bit of work with field dogs, my advice would be to find a good professional and pay him his

SAMMY GIDDENS

***Nida Giddens** and Pete have combined for their share of bobwhites. Pete is only 5 years old, but Nida and her husband, Sammy, have owned Brittanys from the same bloodlines for 20 years, a testament to the good hunting qualities of these spaniels.*

due. He will earn it and can help you keep things straight when you start hunting your dog.

It might seem that a spaniel would have a hard time retrieving heavy ducks and geese. In fact, spaniels are amazingly strong for their size, and experienced dogs will actually push geese along in front as they swim rather than mouth-carry. On land, they manage enough purchase to do the job. A Labrador or Chesapeake retriever would be favored in the surf, in strong river current, or in heavy sound chop, but, otherwise, the spaniels hold their own. They also stow quite unobtrusively in a boat laden with gear.

For those seriously interested in a sporting spaniel, either a Boykin or a Brittany would be a sound breed choice. The Boykin —lesser known—is a flushing spaniel, a strong water dog, and a very capable hunter on feathers or fur. Though the springer is slightly larger and equally adept, the Boykin gets the nod with me because of that beautifully suited deep liver coat that melts into winter woods and marsh as though it grew there. The Brittany is far more capable as a versatile dog than its normal use would suggest, and it has the distinction of being the only true pointing spaniel. Between the two breeds, then, is offered wood, field, and water versatility, a preferential choice of coat color, and a flushing or pointing manner of bringing game before the gun.

The Boykin is an interesting study in regional breed development. It is said that shortly following the turn of the century, a small male dog of brown color and spaniel characteristics was found wandering near a church in Spartanburg, S.C. One of those attending services, Mr. Alexander White, took the dog home as a pet. After showing field promise, the little dog was sent to a hunting companion, Mr. Whit Boykin of the Boykin community outside Camden, S.C., for training. Becoming superb on turkey and waterfowl, this dog was the fountainhead of all Boykins in existence today. As colorful as this story may be, the Boykin likely owes much to the American water spaniel, as they are virtually identical. The American water spaniel is one of a scant dozen breeds developed in America. The American Kennel Club registers Boykins as American water spaniels, not recognizing the Boykin as a separate breed. Nonetheless, the Boykin has earned its title to distinction, and has become increasingly popular in the South. In 1985, the Boykin was designated as the South Carolina state dog.

In its early history, the Boykin was the consummate turkey dog in the Wateree River Swamp. After the use of the dogs for turkey hunting was generally forbidden, owners found it equally suited to a variety of upland game, waterfowl, and fur. As a breed, these dogs have exceptional heat tolerance, a trait

MIKE GADDIS

***Sammy Giddens** and his Brittany, Pete, share a proud moment during a recent bird hunt. The bobwhite quail is their most frequent quarry, but Pete will also retrieve doves and ducks.*

Donald Watkins of Kinston trains one of his bench champion Brittanys during a hunt on a special shooting preserve. Brittanys are the only spaniels that point game, and they are superb retrievers.

of undeniable value in the South. The Boykin is a blend of unique appearance, intelligence, and aquatic retrieving ability coupled with speed, agility, endurance and a burning desire to please. These qualities makes these little brown dogs highly appealing.

The Boykin has become somewhat of a status symbol in the deep South. A Boykin is standard decor at dove hunt socials, and has even displaced the Lab as the retrieving stalwart on many mule-drawn plantation quail-hunting wagons. Tommy Mock, a Georgia friend and Boykin breeder who also runs a quail perserve, told me of a Connecticut gentleman who came for a hunt with companions four years straight and never fired a gun.

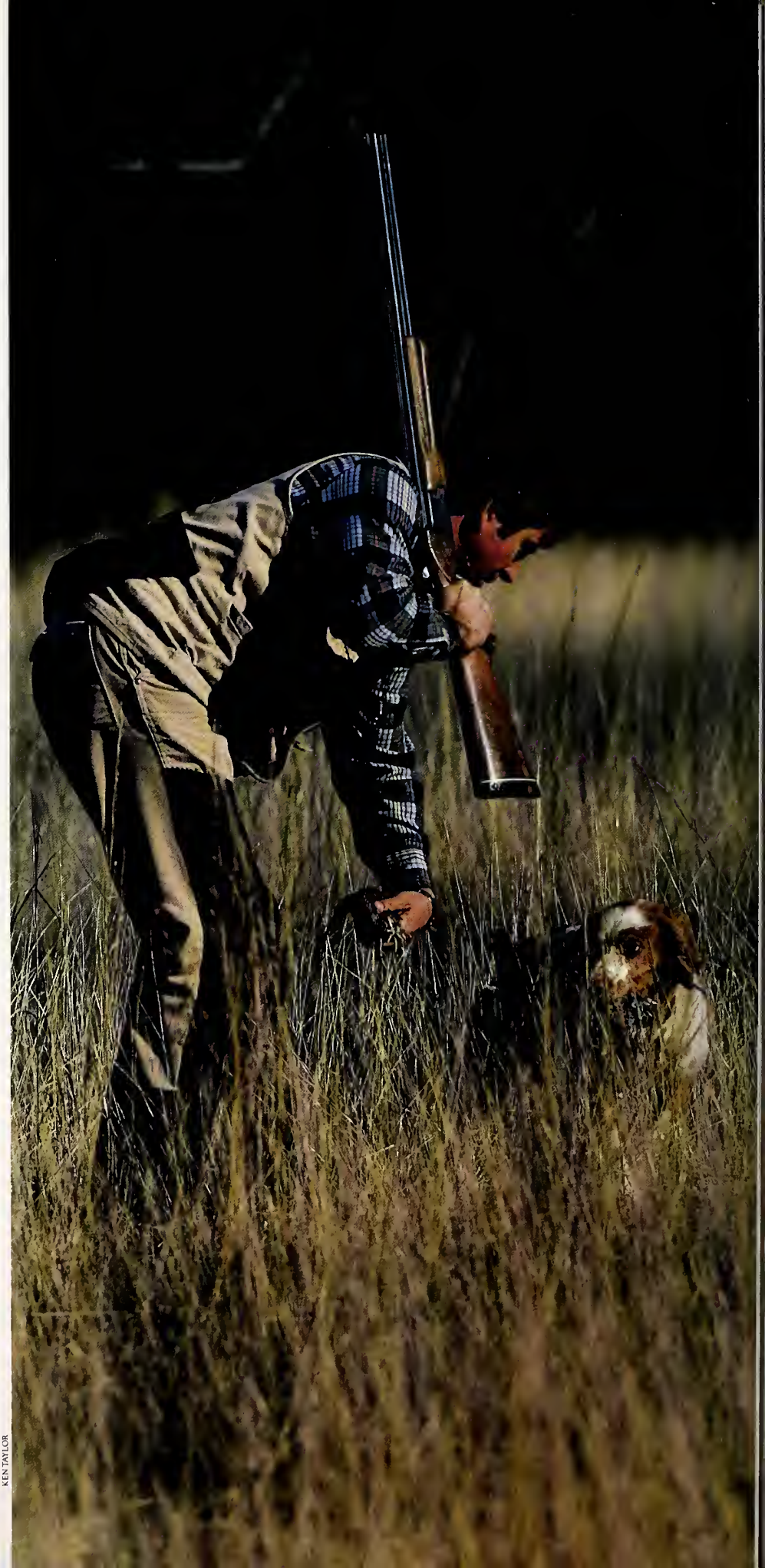
"Didn't care a thing about the shooting," Tommy said. "He just liked the ritual. What he particularly liked was riding the wagon and watching Buck, my Boykin, retrieve. He got a big kick out of that little dog. Buck would sense it and really put on a show."

I'm also reminded about here of the time he asked Tommy why he liked the name "Buck" so much. "Listen, Mock", he demanded in direct Yankee, "Everything on the place is named "Buck", the mules, your horse, the dogs, even that blasted cow. You can't think of no other names or why is that?"

"Well, Mister Fred," Tommy came back in exaggerated Georgia drawl, "that way, when I get ready to load in the mornin' I ain't got to call but once."

While the Boykin is highly recommended, a few words of caution are in order. Before the Boykin Spaniel Society came into being in 1979, and began promoting a sorely needed breed standard, Boykins were in many cases indiscriminately bred. As a result, individual dogs vary widely in conformation and coat texture. Also, hip dysplasia has occurred with enough regularity to be a concern. John Chappell, of Edisto Kennels, offers good advice, "Prospective buyers interested in a Boykin puppy should be most concerned with the sire and dam. Both should be certified OFA Good or Excellent from a hip dysplasia standpoint, and should be observed to see that their type is pleasing. If possible, the same extends to the grandsire and grandam."

In contrast to the homegrown Boykin, the Brittany Spaniel is a French immigrant. A Breton Count lived, at the beginning of the



KEN TAYLOR

19th century, in Pontou, a small community in the Valley of Douran. Like many sportsmen of the region, he hunted woodcock and kept a number of small red-and-white setters, thought to be of British origin. One of these dogs mated with a local bitch of note, which proved the dominating influence, and her litter included two short-tailed puppies. In dog-breeding parlance, a "nick" resulted, and these puppies emerged more spaniel in type, with characteristics superior to the parents. This was the beginning of the Brittany spaniel. Since then, the type has been constantly improved.

The first Brittany spaniel was registered by the AKC in 1934. In 1987, 14,242 Brittanys were registered by the AKC, placing the breed among the top 25 in the country in popularity, and third behind the cocker and the springer in the spaniel ranks. The American breed standard calls for a well-made, proportionate dog averaging 30 to 40 pounds, with a white coat of moderate length and density overlaid with red or orange splotches and specking. The tail is naturally short or docked to less than 4 inches. A proper Brit comes square and well-muscled.

In the South, the Brittany is known largely as a pointing dog, and this has been its predominant field use. It excels in this role, at a comfortable foot-hunting range. Nothing deters its desire to find birds, and it is grand in greenbrier and thicket. Before we relegate the Brittany entirely to the hunting fields it should be acknowledged that Brittanys have won acclaim in direct competition. It takes a good one, but there are some with the stuff. The best field trial Brittany I've known was Nor-Mel's Clyde, owned and campaigned by Norman and Gloria Melton of Snow Camp, North Carolina. I scouted him for Norman a time or two at Hoffman, and he could lay down a shooting dog race on those Sandhill grounds that was masterful. Sublimely smooth, gentlemen! Clyde won widely including the prestigious North Carolina Shooting Dog Celebration, an hour-and-a-half endurance stake, over a field of good pointers and setters. Typically spaniel, Clyde was also a devout member of the immediate family at home.

The Brit's versatility exceeds its normal opportunity. Given the chance, it proves this readily. I am aware of several Brittanys used as pointing dogs on quail, grouse, and woodcock that see extended duty on waterfowl and doves, doing what comes naturally. I would guess they could handle furred game the same way if worked and trained for it.

Over the years, I've seen displays of heart and courage by field dogs that were truly inspirational. There was the time with Sadie, a Brittany. I think of that day often. I was with Sammy Giddens, his three Brits were down, and we were after quail. Birds were scarce. We covered a lot of territory. We made the truck about the time dusk forecloses afternoon. Buck and Thorn, the young dogs, were plainly whipped and ready for the box. Sadie was a matronly 11 years old. She was beginning to fail and was hard of hearing. You wouldn't have known it, because on that occasion she was relentless. What birds we found were hers. It was her day, as if the powers of her youth were at beckon one last time. Nearing the truck, knowing that we were loading, she turned away for yet another cast, catching the edge of an expansive bean field. She was dead tired. You could see it in her gait. But she would not quit.

Worried, Sammy called her. She didn't or wouldn't hear. Now a hundred yards distant, she hung that edge, reaching. Intermittently, she would falter and dig past the pain of exhaustion for a small bit more. Somehow, she would find it. On and on, until the growing darkness took her beyond sight.

"I'm normally a law-abiding man," I told Sammy, "but if she finds birds out there somewhere, we're going to shoot them even if it's on our backs."

She didn't find birds. Almost cruelly, fate chose otherwise. We heard her coming before we saw her, hassling dangerously. She had taken the entire field. She was staggering and Sammy carried her the last 30 yards to the truck. That night, she rode the seat between us. I don't know how it is that such special things come to be. Perhaps she gave us that day so we could never forget her, for she died not long afterward.

Spaniels are like that. The only thing small about them is their size.

KEN TAYLOR

***Bull is a** bench show champion, but the hunting instincts have not been bred out of most Brittany spaniels, and Bull's owner, Donald Watkins, frequently shares days afield with this handsome companion.*

For The Love Of A Bird

Havilah Babcock's passion was partridges, bird dogs, bream and the month of November. His legacy is a series of classic, and often hilarious, stories.

by Jim Casada

illustrations by David Williams

He loved fishing for bream and gunning for bobwhites with rare intensity, and his was a singular passion for the English language. A talented teacher, he also possessed exceptional ability to make that language come alive — both in the classroom and in print. As a true son of the South, he sang songs of her sporting pleasures in a fashion which few writers have ever matched. Indeed, his stories about the "noble partridge," and the dogs that hunt them, stand in a class by themselves. When one considers that talented outdoor scribes such as Robert Ruark and Nash Buckingham devoted considerable attention to quail, that says a mouthful about the man, his literary abilities, and the uncanny knack he had for capturing the essense of the sports he cherished.

The individual in question is, of course, Havilah Babcock. He was a Virginian by birth, a North Carolinian during a portion of his education, and a South Carolinian by residence during his long tenure as an English professor at the University in Columbia. As an outdoor writer though, Babcock transcended state boundaries. He was a man with whom every true Southerner, no matter what state might claim his roots and loyalties, can readily identify.

To join him in the grand quest for quail is to share, with fervor, the genteel company of a sportsman who understood his passion, and knew how to describe it to others. As he put it, "the tense second before a whopping covey explodes is the most nerve-wracking silence in history." To Babcock, no right thinking, properly bred gentleman born and reared south of the Mason-Dixon Line would demand more of the fates than a pair of fine gun dogs, bobwhites in abundance, and a November day with the sun melting frost from broomsedge and sawbriers at mid-morning. The books he left for sportsmen to enjoy through the ages are as timeless as the pleasures they describe.

Havilah Babcock was born in Appomattox, Virginia, on March 6, 1898. The son of H. C. and Rose Blanche Babcock, he spent the years of his youth enjoying the kind of rural existence that typified much of the South at the turn of the century. His family, while patrician in their outlook on matters such as education and the past, were closely wed to the land. On the family farm, which was only a long rifle shot or two from the place where Lee surrendered to Grant in what the elder Babcocks styled "the late unpleasantness," young Havilah became deeply imbued with the myriad traditions Southerners held and continue to hold dear.

These included pride in his roots, a respect for the past verging on reverence, and a closeness to the land. The latter lay at the heart of Babcock's development as a sportsman. From a tender age he was enamored of wild creatures, particularly those that pro-

vided sport, and they would possess a special part of his being throughout his life. Unfailingly he returned to the place of his birth each summer, and just as certainly he hunted quail each fall and renewed his spirits while searching out bedding redbreast bream with every returning spring.

His carefree days of youth, running barefooted through the fields and chasing minnows and crayfish in the branch that wound its way through the lower part of the family farm, endowed Babcock with a rare closeness to and understanding of nature. In time that appreciation, along with countless fishing and gunning forays, would provide him the raw material from which he crafted, with the genius which was peculiarly his, those wonderful outdoor stories which are his greatest legacy.

While still an adolescent he displayed his abilities as a sort of literacy prodigy. A sixth grade teacher promised to let him skip a grade if he would write a short novel over the summer months. To her surprise, he produced the required work in only three weeks, and she found it of such quality that he immediately made the jump to high school. From there he went on to undergraduate studies at Elon College in Alamance County then on to the University of Virginia. At these institutions he read deeply in such diverse authors as Homer and Edgar Allen Poe. Exposure to the delights of fine literature strengthened his resolve to contribute to it. The logical route for one with such intentions was graduate school and a college teaching career, and this was precisely the road Babcock took.

He completed his graduate work at the University of Virginia, and returned to Elon College for his first teaching post before accepting a professorship at William and Mary. In 1926 though, there came an invitation to assume a post at the University of South Carolina. He accepted, and the supposedly temporary position would prove to be a milestone in his development. He and his new bride, Alice, journeyed southward to Columbia, and what ostensibly was a one-year appointment stretched out to 38 years. Along the way Babcock became a veritable institution among succeeding generations of students.

A talented, caring teacher, he was, in the words of a colleague, "incomparable and unpredictable and happily incapable of pedantry or dullness." Students loved him for his eccentricity, his unusual but effective classroom methods, and his ability to breathe joyful life into even the dullest of subjects. Indeed, there was invariably keen competition among students anxious to obtain a seat in his vocabulary course, English 129. Babcock wrote a text, *I Want a Word*, especially for the course, and to peruse its pages is to savor the man's rare gift when it

came to understanding and using the English language.

Also, he clearly was one of those quick-witted, unpredictable classroom magicians whom students love. A case in point, related to me by one of his students, gives some insight into Babcock the teacher. Quail season was at hand, and as was often the case when the tangy aroma of gunpowder and the indescribable beauty of late autumn mornings proved irresistible, he simply cancelled class for the day. This was done through the simple expedient of writing on the blackboard: "Professor Babcock will not meet his classes today." That chore being accomplished, the erstwhile scholar rushed off to attend to more serious business involving bobwhites and double barrels.

Just at the point of departure, however, he discovered that he had left his shotgun shells in the classroom desk. He re-entered the classroom to be greeted by snickers and rolling eyes on the part of the handful of students who still remained. A glance at the board told him the source of their merriment. Some wiseacre had altered his blackboard message through the deletion of one vital letter. It now read "Professor Babcock will not meet his lasses today." Without breaking stride, he picked up the box of shells and an eraser. With the latter implement, he removed the "l" in "lasses" and departed in search of quail. Small wonder that he was a favorite with succeeding generations of students.

In his nearly four decades at South Carolina, Babcock served with grace and distinction. For 27 years he headed the Department of English, and time and again he was singled out for recognition of his excellence in the classroom. When the University's Education Foundation created a Distinguished Professorship, he was its first recipient. He also made some noteworthy contributions as a scholar. In addition to the abovementioned *I Want a Word*, he was the author of *According to Hoyle: A Glossary of Idiomatic and Colloguial Usage* and *The Influence of the Civil War on American Literature*. He also wrote a number of scholarly articles for journals, magazines, and newspapers. It was as an outdoor writer, however, that he found his true metier.

His specialties were quail, bird dogs, and bream, but what set him apart was the tenor and fiber of his work. He began producing sporting stories because of chronic insomnia, and the discovery that his literary efforts helped him sleep and also brought in some welcome additional income was all the catalyst he needed. From the depths of the Depression right up until his death on Dec. 10, 1964, Babcock's pen turned out a steady

stream of articles that appeared in *Outdoor Life, Field & Stream*, *Sports Afield*, and other popular magazines. Later collections of these articles formed the books that are his rich legacy to sporting bibliophiles.

Babcock's style, along with his mastery of the English language, set his work apart from the general, run-of-the-mill "how to" and "where to" material one found in sporting journals. He delighted in whimsy, anecdote, and mood. His was a special aptitude for capturing in print those moments, both glad and sad, every devoted sportsman carries in the storehouse of his memory. Also, he had the ability to express, with great precision, what all lovers of the outdoors know and feel but somehow find difficult to put in words. There is no better way to appreciate this fact, short of reading Babcock in some detail, than through a selection of quotations from his works.

On bird dogs, consider word pictures of perfect points: "A gracefully pointing dog is to me a perennial delight — a scene which, however often beheld, has always a newness about it, one which never fails to bring me a quickening of the senses and a long moment's rapture." Equally appealing was the rarity of a superb retriever: "A beautiful retriever is like a virtuous woman. Her price is far above rubies. For retrieving is what makes the difference between a good dog and a great one. It is the icing on the cake, the cherry atop the sundae, the lace on the bride's pajamas. It is the *summum bonum* of an autumn's day in the field. It is of fortune's cap the very button, and that which makes bird hunting peculiarly a gentleman's pastime."

"Gentleman's Pastime" was precisely what he considered partridge hunting, with both hunter and hunted qualifying on that score. He said, "call him Bob White, quail, bird or whatever you will in the rest of the country, but to elder sportsmen of the South, this saucy little patrician is still partridge. It is *lese-majeste* to call him anything else." In a similar vein he spoke, as have so many others, of the bird's behavior and demeanor: "Although I hunt Bob hard I hunt him fair. I would be loth to take an ungentlemanly advantage of so gallant a gentleman." Babcock went on to say that "most old-fashioned bird hunters feel this way," and he alluded to the words offered by an elderly acquaintance who owned a plantation loaded with birds. "Come back and hunt whenever you wish. And bring an occasional friend with you. But he sure the fellow compares favorably with a partridge."

The company Babcock kept afield unquestionably qualified on this demanding score. During his early years in Columbia he and Alice, who did some substitute school teaching, really scraped to make ends meet. In order to supplement their rather meager income, Havilah journeyed around the state acquiring black-eyed peas, which he then sold to Northern farmers to help improve depleted land. These trips gave him entree to many long-established Low Country plantations and their affluent owners, and Babcock was a master at ingratiating himself sufficiently to receive invitations to return and hunt. Once his sporting tales began to be widely published, he regularly hunted with the likes of Bernard Baruch.

Yet wealth and prestige meant little to him. It was the mettle of the man, along with the availability of outstanding bird hunting, that he sought. Some of the closest companions were ordinary fellows, but they met the qualifications of "gentleman" in the truest sense of the word ("gentle man"). Every Thanksgiving Day for 25 years he hunted with Dr. J. E. Copenhaver, a chemistry professor, and other close companions were a farmer, Doc Rhodes, and Honey Chile, who served as overseer of Rhodes' acres. The latter was, in Babcock's words, "an unfailing colleague and the world's greatest walker," even though he never carried a gun.

In much the same way he looked for diverse companions as hunting partners, Babcock was always anxious to discover new hunting grounds. Rumor long persisted among his undergraduate students that one sure path to an "A" in his course was to provide him access to acres bursting at the seams with coveys of partridges. Although this was pure myth, Babcock carefully nurtured the concept at the onset of each semester through a pronouncement that he would not look upon invitations to hunt with disfavor.

With each passing year, Babcock gained more renown as an outdoor writer of national stature, and he brought to his growing legions of readers a mixture of common sense, folk wisdom, and good humor which was irresistible. Take, for example, his comment on the halcyon days of youth. "I sometimes wonder whether boyhood is all that it is cracked up to be." Yet he had to admit that "boyhood apparently improves with age."

Babcock's books abound with this sort of mixture of homilies, nostalgia, and simple sharing of the delights of good sport and better companions. With the exception of *The Education of Pretty Boy* (1960), a grand dog tale which is the rarest of Babcock's books in the original edition (and all are prized collector's items), his works are collections of stories which first appeared in magazines. These include *My Health Is Better in November* (1947), *Tales of Quails 'n Such* (1951), *I Don't Want to Shoot an Elephant* (1958), and *Jaybirds Go to Hell on Friday* (1964). As is obvious, Babcock had the same winning way with titles as he did with the telling of delightful tales. Posthumously, some of his most popular, enduring stories were collected and introduced by Hugh Grey in *The Best of Babcock* (1974).

Babcock remained active as a writer and sportsman to the end of his years. Every autumn would find him afield with his cherished 20-gauge Parker, and each spring he would rejoice in a reawakening world while wielding his fly rod after redbreast bream on one of South Carolina's Low Country rivers. In later years he suffered serious health problems, but he was never able to give up the cigarettes that were his constant companions during waking hours. Yet, as he put it in his winning way, his health invariably underwent marked improvement come November and the opening of quail season. Temporary rejuvenation from a "dose of quails" notwithstanding, Babcock felt, and keenly, his advancing years. Many of the tales from the latter stages of his career, carry, in the words of George Bird Evans (who wrote his impressions of Babcock in *Men Who Shot*), "an awareness of age, or perhaps the shortness of life."

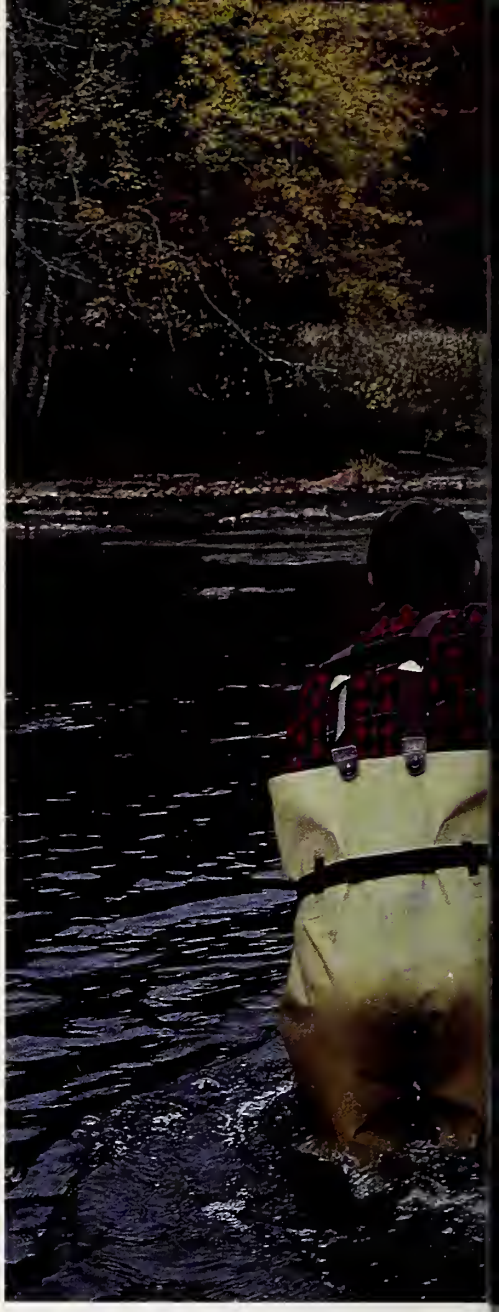
In one of his last stories, "When a Man's Thoughts Are Pure," Babcock muses in a fashion which any sportsman of advanced years will instantly recognize: "The breaking of day is for me a quiet miracle, bringing balm to hurt spirits and a moment of privacy in which to contemplate the day ahead. Forever old and forever new, a sunrise is always and never the same." Equally poignant are the thoughts recorded in "Miss Priss," one of his most moving stories. These suggest that he was looking mortality in the face with a determination to leave something behind. He reckoned "that the best legacy a man could leave his grandson was a good gun and a good bird dog, a hunter of proud lineage whose feet would disdain the faltering pace of groundlings."

Although the original publications are out of print, all of Havilah Babcock's books have been reprinted. Information on availability and cost may be obtained by writing the publishers. "Tales Of Quail And Such," and "My Health Is Better In November" have been reprinted by The University Of South Carolina Press, USC, Columbia, S.C. 29208. "Best Of Babcock," Jaybirds Go To Hell On Friday," "The Education Of Pretty Boy," and "I Don't Want To Shoot An Elephant" have been reprinted by Gunnerman Press, PO Box 4292, Auburn Hills, Michigan 48057.

Of Spinys And Spotfins

A mussel and a minnow are among the extremely rare species of aquatic wildlife still clinging to a precarious existence in North Carolina, but now there's hope they'll survive.

by John Alderman



Name something hard to find. Was your first thought the proverbial needle in the haystack? A contact lens lost in a shag carpet? You could also include some aquatic endangered species. They're hard to find, too.

Why, some people ask, is it necessary to look for endangered or threatened animals like Tar River spiny mussels or spotfin chubs in our rivers or creeks? The answer should be obvious, but is sometimes overlooked. As long as all our native wildlife can maintain healthy populations throughout their historical ranges, people can be assured of clean, healthful water for their consumption. Endangered and threatened animals warn us when water resource problems exist. Furthermore, many wild plant and animal species have unique characteristics that make them valuable to us medically and in other ways. We can ill afford to let them disappear before we even know anything about them.

Yet, warnings are being clearly sounded by North Carolina's aquatic wildlife. Although only about one percent of North Carolina is covered by flowing bodies of water, roughly a third of the more than 300 animal species receiving consideration as endangered, threatened, or of special concern in North Carolina are closely associated with aquatic habitats.

Two groups — mussels and fish — are significantly imperiled by man's activities or improper resource management. At least half of our approximately 60 freshwater mussel species and a quarter of North Carolina's nearly 230 freshwater fish species are finding it more and more difficult to survive in our waters. None of the fish in trouble, however, are species imperiled by sport fishermen.

KEN TAYLOR

***Threatened by** pollution, the spotfin chub (above) barely survives in a decreasing range in western North Carolina, Tennessee and Virginia. Biologists capture spotfins from North Carolina's Little Tennessee (right, above) for later reintroduction to protected habitat in the Great Smoky Mountains National Park.*

JOHN ALDERMAN

Consider the Tar River spiny mussel. It experiences many of the same problems facing our other native mussel species, but this small, clamlike mollusk is found only in North Carolina's Tar River and is presently

KEN TAYLOR

on the federal endangered species list.

Since its discovery in the Tar River two decades ago, the Tar River spiny mussel has become so rare that only seven have been found alive during the past four years. This species may be one of the rarest animals on earth, a suspicion reinforced by the exhaustive efforts we have made to find it. Surveys have been conducted from the headwaters of the Tar River in Person County to Greenville in Pitt County, and all major tributary creeks to the Tar River have also had surveys. It's not an easy job looking for mussels.

***The 2-inch** Tar River spiny mussel (left) is found in only a couple of sites in North Carolina. The endangered mollusk is one of a number of freshwater species increasingly threatened by pollution.*

When the rivers or creeks are high, use of SCUBA or snorkel gear is limited by extremely turbid water. At such times you have to "feel" for the mussels. One search in Edgecombe County was particularly memorable. After an hour of snorkeling and sticking my hands elbow deep in the muck along the shore — all the while covered in a cloud of black silt — I stood up to relax for a few minutes, and felt creatures squirming along my arms, legs, and chest. Eight large leaches had decided that I would make a tasty lunch!

At other times, channels filled with hip-deep sediment (a major form of pollution in North Carolina) the consistency of warm tar had to be traversed, and areas below sewage treatment plants had to be surveyed. My supervisor, Jack Donnelly, and I once fought our way through a swamp filled with mosquitoes, waist-deep poison ivy, and tree-choked creek channels to find ourselves only halfway through the swamp by day's end. (Luckily, some local hunters were kind enough to return Jack to our Jeep, so we didn't have to spend the night there).

Our luck changed in July 1987. Two biologists from the U. S. Fish and Wildlife Service, Debbie Mignogno and Jim Widlak, and I were surveying a section of the lower Tar River looking for spiny mussels. We decided to stop at one site on little more than a hunch. We strapped on our SCUBA gear, and I quickly began checking my designated section of river bottom. I plucked several mussels from the sand, examined them, then returned them. Then, I plucked another mussel from the bottom. It was a Tar River spiny mussel — no mistake! After examining more than 2,000 mussels throughout the Tar River basin, I was looking at a creature many other biologists

had thought extinct. How did I feel? In a way, it was similar to my feelings upon seeing my children for the first time after their birth.

We found three other spiny mussels by the end of the next day, although each of us realized that we might still be the last humans to ever see one. After all, since the mid-'60s, the known distribution of the spiny mussel had been reduced from sites throughout two counties to just one site in one county.

That was not, fortunately, our only encounter with Tar River spiny mussels. Soon after, I found two spiny mussel shells in Swift Creek, an 86-mile long tributary of the Tar River. Later, a graduate student from N.C. State University, Jennifer Howard, also found a living spiny mussel in the creek. Confirmation that the Tar River spiny mussel exists in a tributary creek is especially exciting to the scientific community because if the mussel is extirpated from the Tar River, it may continue to exist as a species in Swift Creek. Then, if conditions improve in the Tar, the mussel could again be introduced to its historic range.

Like many other invertebrates, mussels have extremely complicated life cycles, and we know very little about the biology of the Tar River spiny mussel — too little at this point. We suspect it has a life cycle similar to other mussels. The immature mussel must attach itself to the gills or fins of certain fish species and live parasitically on the fish for a short time. When environmental conditions are right — perhaps when the fish swims upriver to a suitable habitat — the young mussel pulls free from the fish and settles to the bottom to start its life as a filter-feeding animal living in the sediment. Dr. Dick Neves, a fisheries professor from Virginia Polytechnic Institute, has been given a contract to determine the reproductive biology of the Tar River and James River

***The robust** yellow mucket* (Lampsilis cariosa) *is one of many freshwater mussels that will be listed by the state as rare species. Visible is one of the mussel's two siphons that draw water in and pump it out, enabling it to feed. Because mussels are filter feeders, toxic substances in the water can kill the mussel.*

KEN TAYLOR

spiny mussels. Globally, there are only three spined mussel species, and Dr. Neves' work should significantly improve our understanding and management of these species.

Among the questions awaiting answers are these: How much longer can the Tar River spiny mussel hang on under existing conditions? Has pollution caused its decline, and if so, what kind of pollution? If a toxic substance is affecting the mussels, might it also affect people who get their drinking water from the Tar River? Is the decline of mussels the result of population declines in host fish? Finally, is there a way to restore the species?

Similar questions apply to other troubled aquatic species. The spotfin chub, for example is a federally listed threatened fish species found in western North Carolina. Siltation, pollution, reservoirs, and construction activities have reduced its range within the Tennessee River system from five states to three states. Though once found in 12 tributaries of the Tennessee River, it is now found in only four tributaries — the Little Tennessee in North Carolina, the Holston River in Virginia and Tennessee, and the Duck and Emory Rivers in Tennessee. The spotfin chub prefers warm, free-flowing streams wider than 50 feet with very little siltation.

Some of the spotfin chubs from the Little Tennessee River are being taken to reintroduce the species into Abrams Creek in the Great Smoky Mountains National Park. In the past, spotfin chubs were found in Abrams Creek, and conditions in the creek may have improved sufficiently to allow for successful reintroduction. By establishing the spotfin chub in the park, scientists can better isolate the species from the many negative impacts found throughout its present range. This will also help ensure the species' continued existence should conditions worsen elsewhere. Even so, if this species is lost from the Little Tennessee River, the number and range of sentinel animals will decrease.

How has North Carolina managed to create such problems for so many aquatic species like the Tar River spiny mussel and spotfin chub? Apparently, it's partly because of the way we have developed as a state. North Carolina is the tenth most populated state in the nation, yet it is also one of the most rural. Forty-six percent of our population lives in rural areas. Unlike states where most people live in one or two large cities, we have spread out over the land. In states with only a few large urban areas, sources of pollution are concentrated in relatively small areas, and state or local governments can more closely monitor pollution sources. However, in North Carolina we have over 2,500 sewage treatment plants and other point sources of pollution. Worse, approximately one third of these facilities are not in compliance with their permit limits, and because of limited staff, many plants may go uninspected for years.

MELISSA McGAW

***The Carolina** madtom is a 3 - 5 inch fish endemic to the Neuse and Tar river drainages. Its habitat is free-flowing water over gravel and coarse sand. Sedimentation caused by reservoir construction and poor farming methods threatens the madtom's habitat.*

MELISSA McGAW

***Author John** Alderman reaches into the cool waters of Swift Creek searching for spiny mussels. Biologists are finding that the decline of so many aquatic species can be attributed to the poor water quality in many North Carolina rivers and streams.*

This situation with our dispersed population and equally dispersed sources of pollution from cities, farms, and roadways makes it more difficult to control adverse effect on our endangered and threatened aquatic species. Yet, the long-range outlook is not entirely gloomy. With most troubled species, the chances of survival improve when each species is found and studied.

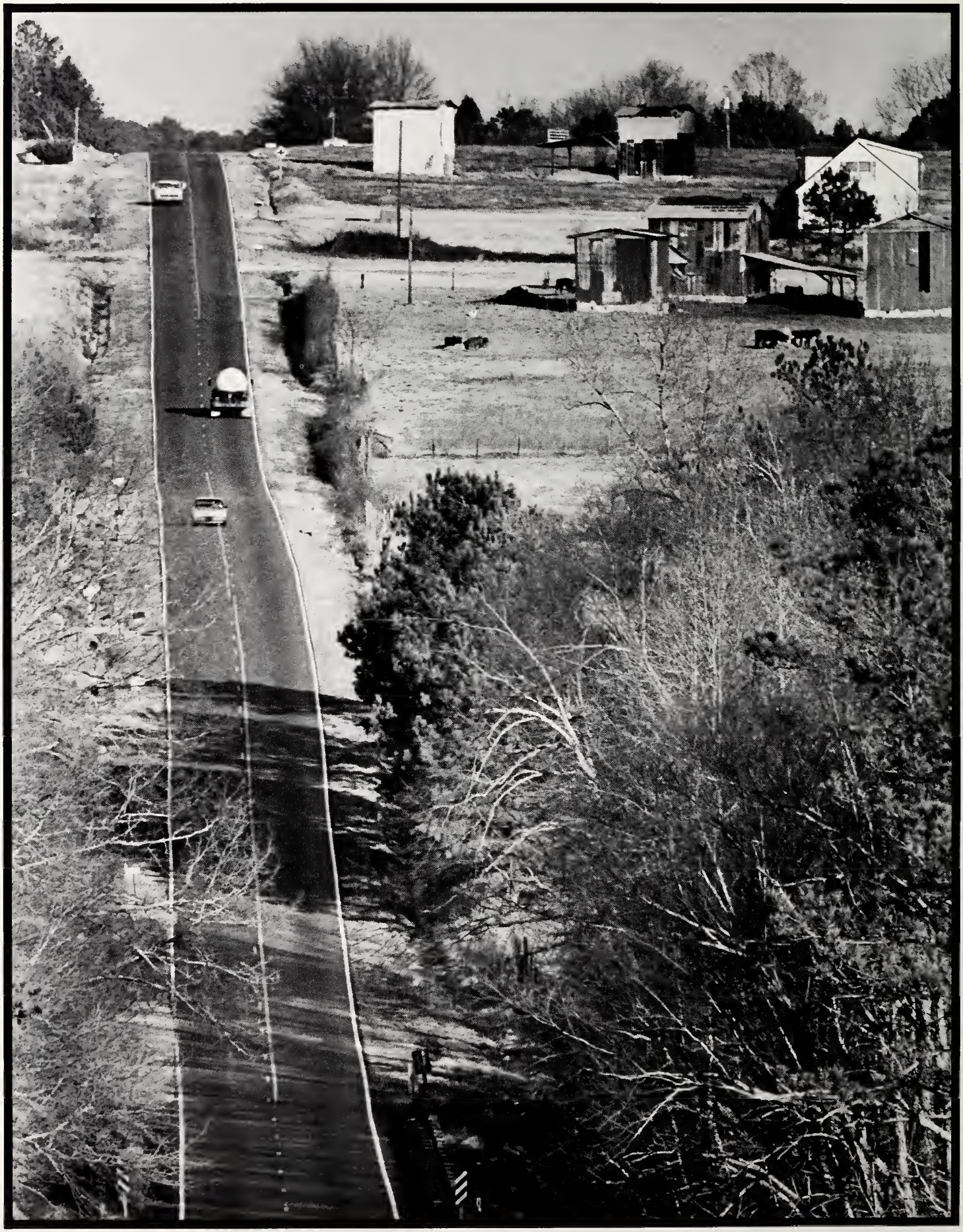
And what about spiny mussels and spotfin chubs? It's too early to predict, but there is still hope as long as any remain alive.

When you pick one up you know that you're holding the future in your hands. Perhaps ours, as well as theirs.

Who Cares For Wildlife?

NONGAME & ENDANGERED WILDLIFE FUND

You do, of course, and that's why you may like to know you can earmark a donation to specifically help nongame and endangered wildlife. Make your contribution directly or through the income tax checkoff to the Nongame & Endangered Wildlife Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.



Country Roads

photography by John Rottet

Perhaps you remember Sunday afternoons when a drive in the country was part of almost every family's ritual. Still wearing his white, go-to-meeting shirt, Dad would gather the clan — some willing, some not — and drive out of town past neighborhoods that smelled of pork roast and fried chicken.

On winding two-lane blacktops and dirt roads, the afternoon would unfurl like a familiar old movie — a documentary of local landmarks, old home places and long-gone kinfolk. You'd pass the horse standing under the old tree, and that would remind Mom of Granny's mule, the one that ate the cake of soap. She'd tell you about it, again.

Leading a parade of impatient traffic, Dad would pull off beside the sagging tobacco barns and tell you how he used to sit up all night to tend the slow fires that cured the leaf — telling tales, listening to night bugs and making forays into the nearby field to pull fresh ears of corn that were roasted in their shucks over the coals. Or how he and other farm hands, before the days of pesticides, would bite the heads off tobacco worms for the handsome bounty of one penny per worm. And you would add your own memories — the old house on the hill where the family once stopped long ago to buy molasses. When was that, anyway, you ask?

Farther on, upstream from the bridge at the millpond dam, there would be kids watching corks, waiting for punkinseeds. Often, the younger riders would play cow poker, one point for each cow on their side of the road, 10 points for a white horse or gray mule. A cemetery on your side of the road cancelled all your points, and you had to start over.

You remember, don't you? And if not, accept photographer John Rottet's invitation to take a leisurely afternoon drive on North Carolina's country roads. If you have no family homeplaces along the route, no kin to visit, you can share ours. We don't mind. That could be your Uncle Andy and nephew Opie on that dirt road. Welcome home, folks. — *Jim Dean*

WILDLIFE in the WINDROWS

A hedgerow might not look like home to you, but its dense cover provides a virtual oasis for wildlife, especially small game.

by Terry Sharpe

You might think of a hedgerow as a hedge, but not one of those ornamental hedges of privet, boxwood or ligustrum that border your front lawn. Instead, think of a hedge gone wild—a rangy thicket of natural plants dividing a field or running along a line of woods. Webster's Dictionary refers to a hedgerow as a fence of small trees or shrubs.

Such a hedgerow is ideal wildlife habitat—especially for small game. Yet ironically early North Carolina settlers, familiar with hedges from their former homes, constructed fences from limbs, brush, and rocks not to attract wildlife, but to keep larger species of wildlife and free ranging livestock away from their crops. Hedge-laying, a common European practice, made developing hedgerows impenetrable, and was accomplished by cutting almost through the stem of shrubs and trees composing the hedgerow, pushing them over and staking them with sturdy sticks. Resprouts from the nearly severed stems would thicken the hedges.

Hedgerows in the country today more

***White-tailed** deer pause at this drainage ditch between two large eastern North Carolina fields (left). Already, this border shows signs of developing into a classic hedgerow, and over a period of time, it will naturally grow into thick, classic hedgerow cover offering food and protection for wildlife. Blackberries (below) are a common hedgerow species, and are particularly beneficial to small game.*

RICK ESTES

KEN TAYLOR

SID BAYNES

***Hedgerows need** not be cultivated, and will naturally generate a good mix of plants that provide food and cover for wildlife. Birds and other wildlife resting in the low cover help plant the very species they favor by depositing seeds in their droppings. Landowners can aid this process by placing piles of brush along developing hedgerows, or by planting additional food and cover plants like this shrub lespedeza being checked by biologist Harlan Hall.*

commonly hide a rusted wire fenceline, mark the dividing line between adjacent properties, or follow a land feature such as a drainage ditch.

From early on, however, farmers have recognized the benefits hedges offer for small game species, such as quail and rabbits, as well as many other species.

"Managed hedges may be expected to increase the small, seed-and-insect-eating birds on the farm; provide food, cover and travel lanes for small farm game species, and furnish food to the farmer by producing small fruits and berries," notes one old farm publication.

The list of wildlife species using hedgerows is lengthy and includes upland songbirds, gamebirds, game mammals and furbearers. We even refer to many wildlife species as "hedgerow" species because of their close association with hedges in agricultural areas. Common hedgerow birds include towhees, white-throated sparrows, mockingbirds, and bobwhite quail. A variety of reptiles and insects also frequent the safe refuges formed by the dense cover.

Unfortunately for many wildlife species, hedgerows are not as common as they once were. The tangled network of vines and stems of a multitude of plant species often don't fit into the plans of landowners who opt for neatly mowed spaces, trimmed fencerows and clean field borders. Indeed, many modern farmers eliminate hedgerows by cutting, chopping or spraying to make room for crops.

Nor have efforts to recognize the value of hedgerows and restore them always been successful. *Multiflora rose*, a Japanese species, was once heavily promoted by conservation organizations, including the N.C. Wildlife Resources Commission. Rose fencerows dating from the 1940s and 1950s are still common across the state. However, multiflora rose turned out to be too aggressive for most landowners. Seeds transported by birds germinate quickly in fallow farmland and in woodlands, and abandoned pastures can quickly develop into impenetrable jungles. Because of this, recent literature is more concerned with describing various means to control and eliminate this exotic.

In spite of the disadvantages of multiflora rose, its hedges provide excellent food and cover for many wildlife species, including bobwhite quail and cottontail rabbits. Those North Carolina farmers who have learned to tolerate the plant are therefore rewarded with better than average small-game populations.

Blackberry, grapevines, wild cherries, sassafras, plums and mulberries also develop into tangled barriers along fences, roadsides and property lines. Each of these species provides an important source of food and cover to a variety of wildlife. Many shrubs and vines that grow along hedgerows produce fruits during the summer months. In fact, a hedgerow comprised of a variety of plant species will produce a progression of fruits throughout the summer and fall.

In 1986 I saw firsthand how this worked to offset the disastrous effects of drought. A family of bluebirds, a species that customarily feeds its young insects, nested in my backyard, and the first nesting attempt of the summer resulted in the fledging of two of the five young hatched. The second nesting attempt, however resulted in the fledging of the entire brood. When I cleaned the nesting material from the box after the second brood fledged, I was surprised to find half a cup of wild cherry pits in and on top of the nest material. Apparently the presence of a fruiting wild cherry in a hedgerow along a neighbor's fence had supplemented the insects that were scarce that summer.

Quail, especially, depend upon hedgerows extensively in farming country. In fact, one study has documented the decrease and eventual loss of a quail population in a midwestern township due to the elimination of hedgerows because of increased farming operations over a 25-year period. Quail often depend upon fruits for over half their food during the summer months and studies indicate that availability may be more important than preference to quail. Along one field edge a pair may be feeding on blackberries while the neighboring pair along the fencerow across the field are eating the pulp of plums or sassafras berries.

Even more important to quail than the food produced by hedgerows is the protection they afford many species from their enemies. Herbert Stoddard, an early quail researcher, recounts the observations of one of his neighbors who observed an unsuccessful attempt by a Coopers hawk to capture a quail from a covey hiding in a blackberry fencerow.

"The hawk followed the quail into the thick blackberry bushes, but couldn't fly through all the brambles and was forced to hunt on foot. The hawk tried for a long time, but simply wasn't quick enough to catch the smaller, more elusive quail."

Many of the vines, shrubs, and small trees that are important components of hedgerows occur most frequently in the intermediate stage of plant succession. That is, few persist as important species in frequently disturbed farmland or in the shade of mature closed-canopy forests. Increasingly efficient farmers, foresters, and homeowners have severely reduced the numbers of many species of these plants.

The survival of many of these valuable species along fencelines is no accident—it's one place that's least likely to be disturbed. Also, when a bird eats a blackberry and passes the seed while perched on a nearby fence, a hedgerow is being planted. The system is efficient because the fleshy pulp of the fruit benefits the bird and, in turn, the bird distributes the hard coated seed to a new site. Blackberry, plum, sassafras, and grapevine also provide their "dinner guests" with protection from enemies.

Many homeowners and landowners who enjoy wildlife may want to manage a narrow strip of their property for hedgerow plants. Often this is more a matter of careful inventory and planning what *not* to do than purchasing and planting plants. Most fencelines if left to nature will develop into a variety of desirable hedgerow species that produce food and cover for wildlife. On your next Sunday afternoon stroll look closely at your neighbor's fence or under a powerline. Though probably suppressed by frequent mowing, chances are that a hedgerow is being established by birds.

If you have a site that you would like to establish in a hedgerow, one technique that will yield a variety of species is to pile brush or tree tops along the site. Be patient. The birds will plant the seeds of the species they prefer and in a few years your hedgerow will volunteer. It's also like magic, but more practical.

Over a long period of time, you may have to do a little upkeep to maintain a prime hedgerow. Fast-growing or dominant trees seeded from adjacent stands of woods or from sprouts may eventually shade out the more desirable hedgerow species. In most of North Carolina, sweetgums or pines will be the species most likely to shade out better fruit producers, and you'll want to cut these occasionally when they grow too large.

But aside from that, there is very little labor involved in hedgerow construction. The birds do most of it, and for them it's a labor of love.

Improve Your Wildlife Hedgerows

For impatient souls who want to speed along the process of hedge formation, or add diversity to an existing hedge, the following native or naturalized shrub species can be planted. You should try to include enough variety to provide year-round fruit.

SPECIES	GROWTH FORM	FRUITING DATES
Mulberry	Tree	May – June
Serviceberry	Small Tree	June – July
Wild Cherry	Small Tree	July
Wild Plum	Shrub	June – July
Blackberry	Shrub	June – July
Sassafras	Small Tree	July – August
Hawthorne	Shrub	September
Wild Grapes	Vine	July – October
Dogwood	Small Tree	Fall – Winter
Honeysuckle	Vine	Winter
Persimmon	Small Tree	Fall – Winter

LEONARD LEE RUE III

***A cottontail** rabbit in the open is likely to become a cottontail in the gullet of some predator. In this era of clean farming, good hedgerows become even more vital habitat for rabbits, bobwhite quail and other small game.*

Nine Sites Open To Public

Wildlife Demonstration Farms Established Across State

Written and Edited by Angela Dorman Hill

Farming has been a way of life for many North Carolinians for centuries.

It has meant plowing corn, harvesting tobacco and soybeans, feeding the chickens and milking the cows. But our farms have traditionally produced another crop that some people take for granted — quail, rabbits, deer, songbirds and other species of wildlife.

In recent years, some wildlife species — mostly quail and rabbits — have declined in numbers. The causes of this decline are unclear, but the loss of habitat resulting from the adoption of modern "clean farming" techniques has played a part. It's not hard to run an efficient farm and also have healthy wildlife populations, and recently a statewide network of demonstration farms was set up to prove this idea.

The project is a cooperative effort of the Wildlife Commission, the N.C. Wildlife Federation, the N.C. Agricultural Extension Service, and the U.S. Soil Conservation Service.

"There are nine demonstration farms, one in each wildlife district across the state," said Terry Sharpe, small game project leader for the N.C. Wildlife Resources Commission. "These farms are not operated by government agencies or owned by wealthy individuals, but are typical working farms operated by farmers who are interested in wildlife. Some of the landowners are interested in improving hunting for small game or waterfowl while others simply enjoy seeing a variety of wildlife on their farms."

The demonstration farms represent a cross section of North Carolina agriculture. There are row crop operations raising peanuts, soybeans and corn, a pick-your-own vegetable farm, a tobacco farm, beef cattle and hay farms, and a Christmas tree farm. Most of these farms include woodlots that are managed for timber and wildlife.

Wildlife management practices conducted on the farms include forestry and agricultural practices. In farm woodlots, mast and den trees have been preserved and timber has been thinned and selectively cut. Controlled burns and disking of the forest floor have been used to stimulate the growth of native plants and weeds that are important sources of food and cover for wildlife.

Agricultural practices include protecting waterways with filter strips, planting food plots, establishing screens of shrub lespedeza and pines along roads and others. Waterfowl impoundments and ponds have also been built on some farms.

The work on each farm has been supported by a $500 grant from the N.C. Wildlife Federation. This grant helps cover the cost of planting materials, equipment and other expenses.

"We want people to realize that wildlife habitat can be improved without spending a lot of money," said Bob Hazel of Garner. Hazel is a member of the board of directors of the N.C. Wildlife Federation and helped develop the demonstration farm program.

"The key to improving wildlife habitat is to provide a diversity of cover and habitat types, and there are quite a few things landowners can do that aren't particularly expensive or time-consuming. It's surprising how quickly wildlife will respond to this work."

Although the demonstration farms are newly established, tours can be arranged for schools, farm and forestry organizations, wildlife and conservation clubs and others.

"This network of demonstration farms will be a great help in showing the public how wildlife habitat can be improved," said Ed Jones of Raleigh, wildlife extension specialist for the N.C. Agricultural Extension Service.

"There is a great deal of potential for improving wildlife habitat on private lands in North Carolina, and we're really looking forward to working with interested landowners and groups through this program."

— Mark Taylor

JACK DERMID

Hideaway: *Quail Nests are common on demonstration farms.*

Group Seeks New Members

"Friends Of State Parks" Boosts Parks

Our state parks need friends, and you may be one.

If you're interested in improving the quality of our state parks, consider joining the Friends of State Parks — a nonprofit group that works to improve and protect individual parks.

"We act as an advocate for parks and we also become involved in protection efforts when they are threatened," said Rob Conners of the organization. "Volunteers also work to improve individual parks through the development of programs, improvement of trails and other projects."

The organization is also involved in setting up Adopt-A-Park groups for individual parks, and it promotes special events in the parks.

"It's a good opportunity to get outdoors, be involved in conservation projects, participate in special outings and meet interesting people," said Connors.

Information on the organization is available from Friends of State Parks, 4204 Randleman Road, Greensboro, N.C. 27406.

Survive After Injuries

Fish Unharmed After Release

Catch and release of fish has always been a controversial subject.

Many anglers feel that injured or even healthy fish that are caught and released will later die of their injuries or stress.

But, those who doubt the value of catch and release should consider the case of Dora, England's most famous northern pike. A recent issue of *The International Angler*, published by the International Game Fish Association, reports that Dora was initially caught and tagged in 1985, and since then has been caught and released seven times by anglers. On two occasions, Dora was a national record fish of 41 pounds, 6 ounces and 42 pounds, two ounces.

The growing popularity of tagging and releasing large offshore game fish such as marlin and sailfish also shows that many badly injured fish survive. For example, last year, an angler caught, tagged and released a black marlin off Australia's Great Barrier Reef. The fish fought hard, was bleeding profusely from the gills and was exhausted when it was finally boated. Several weeks later, however, the same fish was recaptured by another angler. The fish's wounds had healed and it was in good shape.

Closer to home, the Texas Parks and Wildlife Department recently studied hooking mortality in white, striped and hybrid bass. Wildlife employees caught fish on artificial lures from three lakes. The fish were held in boat livewells and then were placed in observation pens after the day's fishing trip had ended. They were observed in the holding pens for 72 hours.

All 47 white bass collected survived. Of the 47 striped bass caught, five died for a 10.6 percent mortality rate. Seventy-five hybrid bass were caught, and only one died—a 1.3 percent mortality rate.

There is certainly nothing wrong with keeping fish. After you have caught what you'd care to eat, there's also nothing wrong with continuing to fish and release your catch. The fish stand a better chance of being around to fight another day than you might think.

DAVE WOODY

Catch and release: *A North Carolina angler finds a perfect mountain stream from which to catch fish and release them.*

Good Reading

Ocracoke Portrait by Ann Sebrell Ehringhaus. $13.95, paperback, 107 pages. Published by John F. Blair, 1406 Plaza Drive, Winston-Salem, NC. 27103.

North Carolinians who have never seen Ocracoke Island on the Outer Banks are missing a rare opportunity to see life on a small island that is accessible only by ferry. *Ocracoke Portrait*, a book of photographs and interviews by Ann Sebrell Ehringhaus, is a great way to see the island through print. Ms. Ehringhaus first saw the island in 1971 as a 22-year-old school teacher. She fell in love with the people and their lives and began to document her experiences with photographs and interviews. The 107-page paperback begins with a history of the island. Next are photos of people, places and things in four parts—Spring, Summer, Fall and Winter. The book provides pleasurable reading for people of all ages.

For Eno River Protection

Durham Conservationist Wins Award

THE CONSERVATION FUND

A Job Well Done: *Margaret Nygard of Durham is the first recipient of the prestigious Alexander Calder Conservation Award for her efforts to protect the Eno River in Durham. The national award is sponsored by the Union Camp Corporation, and recognizes individuals who have achieved significant results in protecting natural areas through cooperative efforts between conservation organizations and businesses. Nygard was one of the founders of the Eno River Association, and was instrumental in establishing the Eno River State Park in 1973. Since that time, she has also worked to secure additional lands along the Eno River. To date, nearly 5,000 acres have been protected.*

1980s Experience Warming Trend

If you think it's getting warmer, you may be right.

In fact, the N.C. Agricultural Extension Service reports that research by an English scientist shows that the 1980s have been the warmest decade in the last 100 years.

This conclusion was reached by climatologist Thomas Wigley of the University of East Anglia in Norwich, England. After examining a century of weather records, he found that the five warmest years in the last 100 were 1980, 1981, 1983, 1986 and 1987.

James Hanson of NASA's Goddard Institute found that 1988 exceeded temperatures of 1987, and attributed the trend to the accumulation of "greenhouse" gases in the atmosphere. These gases, which include carbon dioxide, methane, nitrous oxide and chlorofluorocarbons, absorb heat from the sun and are produced primarily by the burning of fossil fuels.

Although scientists are generally in agreement over the possible long-term effects of greenhouse gases, there is less consensus over whether recent warming has been caused by the gaseous build-up.

Although the warming trend is small, it appears to be persistent and accelerating. Scientists also note that the destruction of the world's tropical rain forests may be contributing to the problem.

Field Notes

Season openings, closings and regulation changes:

- Wild turkey season open from April 8 through May 6.
- Trout season open from April 1 through June 30, 1989.

Largest Tract In Dare County

Nature Conservancy Buys Land For Protection

Over 10,000 acres of near wilderness have been protected in North Carolina recently, thanks to several land acquisitions by the North Carolina Nature Conservancy.

The largest purchase is a 9,988-acre tract in Dare County. This land has been added to the Alligator River National Wildlife Refuge, and was purchased from Prudential Insurance Company of America for $3.5 million. The refuge now totals 137,411 acres, and serves as important wildlife habitat for black bears and many other wildlife species.

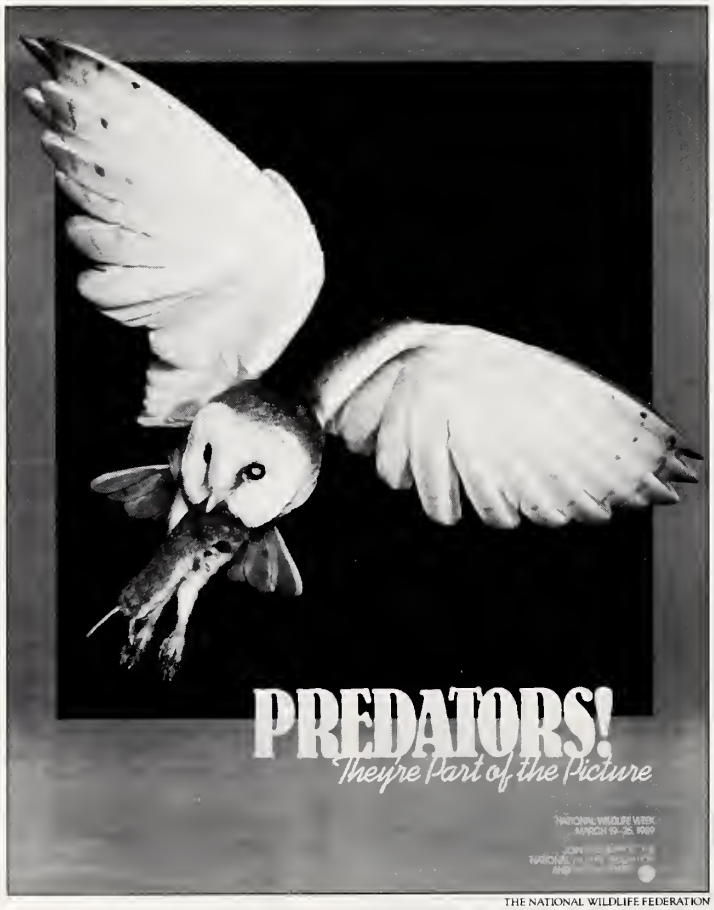
An 888-acre tract was also purchased from Georgia Pacific Company, and added to Lake Waccamaw State Park. Several rare fish — the Waccamaw darter, killifish and endangered silverside — are found in the lake and headwaters of the river. Rare mollusks include the Waccamaw lance, spike and musket. Alligators are also found in the lake and river.

The Conservancy also purchased a 7.5-acre tract in Robeson County which completes the acquisition of Pretty Pond Bay, one of nine Carolina Bays protected by the Conservancy. These scattered, wetland depressions support many rare plants.

The N.C. Nature Conservancy has protected over 300,000 acres in North Carolina since it was formed in 1977, and is supported by individual and corporate donations. More information is available from the N.C. Nature Conservancy, P.O. Box 805, Chapel Hill, N.C. 27514.

Observed March 19-25

Predators Focus Of Wildlife Week



THE NATIONAL WILDLIFE FEDERATION

Change of Heart: Predators! They're Part of the Picture *is the theme of this year's National Wildlife Week, which will be observed from March 19-25. The celebration is designed to promote awareness of the role that predators play in our environment. Teachers may obtain a free Wildlife educational kit from the National Wildlife Federation, 1400 16th St., N.W., Washington, D.C. 20036.*

Dove Hunter Arrested Twice

A Robeson County resident who was arrested twice for dove hunting on separate days will now wait a year before hunting again — if he can afford another shotgun.

The first violation, hunting doves without a license and hunting with an unplugged shotgun, brought the subject a $150 fine and court costs and an order to turn over the gun to the N.C. Wildlife Resources Commission.

On another day, the same individual was charged for hunting doves without a license and hunting from a roadway. He had to pay another $150 fine and court costs, lost another shotgun and was ordered not to hunt for a period of one year.

Calendar Of Events

On several occasions, events in this calendar have been changed or canceled without notice. Readers should check with the contact listed before traveling to an event.

March 3-5
Dixie Deer Classic at the North Carolina State Fairgrounds in Raleigh. Displays of trophy deer, hunting equipment, and seminars on hunting and deer management. For more information write Dixie Deer Classic, P.O. Box 12202, Raleigh, N.C. 27605 or call 919-821-7400.

March 4-5
Showcase of Woodcarvings at the Grady Cole Center (formerly Park Center) in Charlotte. Sponsored by the Charlotte Woodcarvers Club and the Charlotte Parks and Recreation Department. For more information write to the Showcase of Woodcarvings, 1418 Armory Drive, Charlotte, N.C. 28204 or call 704-336-2584.

March 11-12
208th anniversary of the Battle of Guilford Courthouse at the Guilford Courthouse National Military Park in Greensboro. Program of events commemorates this important battle of the Revolutionary War. For more information write to the Guilford Courthouse National Military Park, P.O. Box 9806, Greensboro, N.C. 27429 or call 919-288-1776.

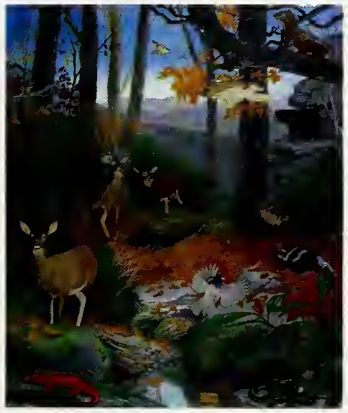
March 17-19
North Carolina Commercial Fishing Show at the Crystal Coast Civic Center in Morehead City. Boats, gear and other aspects of commercial fishing. For more information write Sandra Kellum, P.O. Box 859, Beaufort, N.C. 28516 or call 919-247-2813.

New Nongame Print Offered

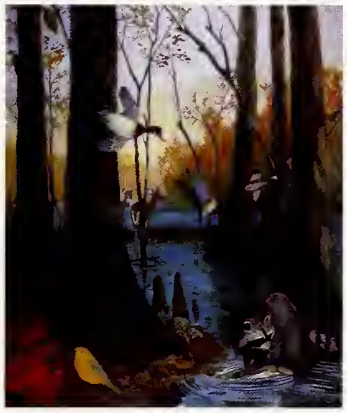
"Forest Life of the High Peaks," the 1988/1989 Nongame and Endangered Wildlife Print, is now available. "Bottomland Hardwood Forests" (featured below, right) is also available for sale.

Proceeds from the sale of these full-color prints will be placed in the Nongame and Endangered Wildlife Fund which supports a variety of nongame wildlife projects and the purchase of wildlife habitat in North Carolina. Each poster-sized, numbered print bears artist David Williams' signature.

Order information is available on page 33.



1988/1989



1987/1988

Calendar Sells Out

The N.C. Wildlife Resources Commission has sold out its 1989 North Carolina wildlife calendars.

By Dec. 15, all 11,000 calendars printed had been sold.

"We are very pleased that our calendars sold out so quickly this year," said Connie Spivey, chief of the Commission's Division of Administrative Services. "While we will not reprint the 1989 calendar, the increased demand will be considered next year."

The 1989 calendar features the work of well-known wildlife artists such as Bob Timberlake, Larry Barton, Duane Raver, Robert B. Dance, Alan Cheek, Bob Herr, Bob Henley, James A. Brooks, Ronald J. Louque, Louis Frisino and Judy Johnson McPherson.

Persons who want a 1990 calendar should get the request in early next year to the Wildlife Commission.

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on December 31, 1988

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	46,126	$15,673,596.36
Lifetime Hunting License	437	113,367.97
Lifetime Fishing License	3,518	714,411.41
Lifetime Subscriptions to Wildlife in N.C.	1,514	199,172.20
Contributions	—	137,017.06
Fund Total	51,595	$16,837,565.00
Total Interest Earned	$3,707,120.78	

Our 50th-anniversary book — *Wildlife in North Carolina* — is a gift for all seasons!

It doesn't have to be Christmas to give a book that will delight and inform. From 50 years of *Wildlife in North Carolina* magazine comes this big hard-cover book, packed with wildlife art, color photographs and great outdoor writing.

Readers say:

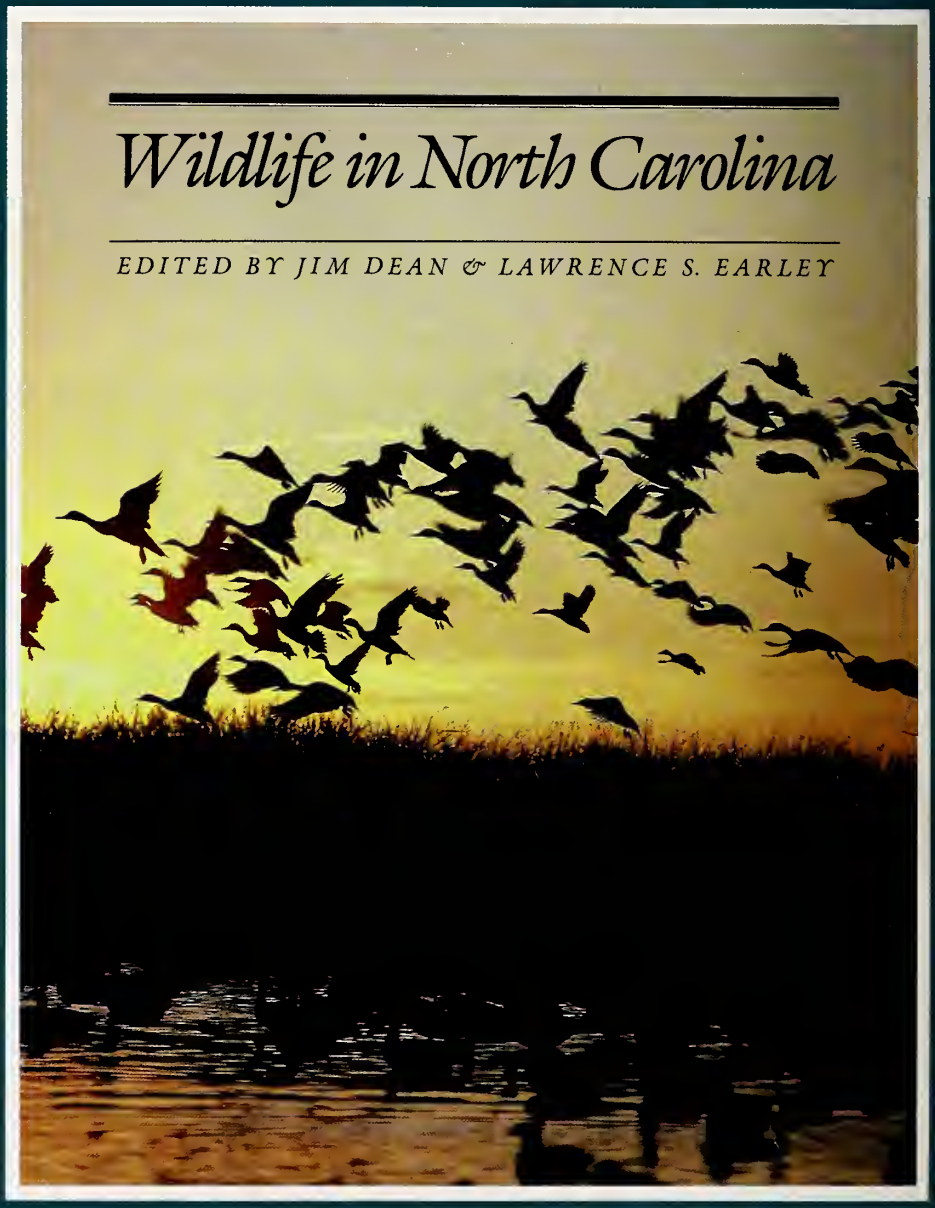
"This attractive book is probably intended for the sports or outdoors person; but in fact it should appeal to anyone with an active interest in our state's history, natural or otherwise."

—*Michael McFee*, The Spectator

"It is not only for the sportsman in the family but for all the family and an excellent book to send both to Tar Heels who have moved away and to folks who have just moved into North Carolina."

—*Bugs Barringer*
Raleigh News and Observer

Published by the N.C. Wildlife Resources Commission and the University of North Carolina Press. Hardbound copy is $24.95 at bookstores everywhere. Or order direct using the special order form below.



Book Order Form

WINC

Please ship my copy(ies) of *Wildlife in North Carolina* — "the book" — to:

Name _____

Address _____

_____

City _____

State _____ Zip _____

Send prepaid order to: University of North Carolina Press, P.O. Box 2288, Chapel Hill, NC 27514.

Please send me _____ copy(ies) at $24.95 each $_____

Sales Tax: Orange County add 5% Other NC add 3% $_____

Shipping Charges: $1.50 for first book, 75¢ each additional book $_____

Enclosed is my payment $_____

☐ Check/money order payable to **UNC Press**
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Account # _____

Expiration Date _____/_____

Signature _____

SUPPORT THE NONGAME AND ENDANGERED WILDLIFE FUND

The money you give to help restore the peregrine falcon also helps the spiny mussel, green sea turtle, bald eagle and many other nongame species. (Contribution form page 33)

Waiting For Wood Ducks

Perhaps you can't read a dog's mind, but you can certainly guess what this Boykin spaniel is thinking. "Come on, boss, stop fooling around with that camera and let's get going. It's getting late and those ducks are going to be coming in anytime now."

LITHOGRAPHY BY EDWARDS & BROUGHTON COMPANY, RALEIGH, NORTH CAROLINA

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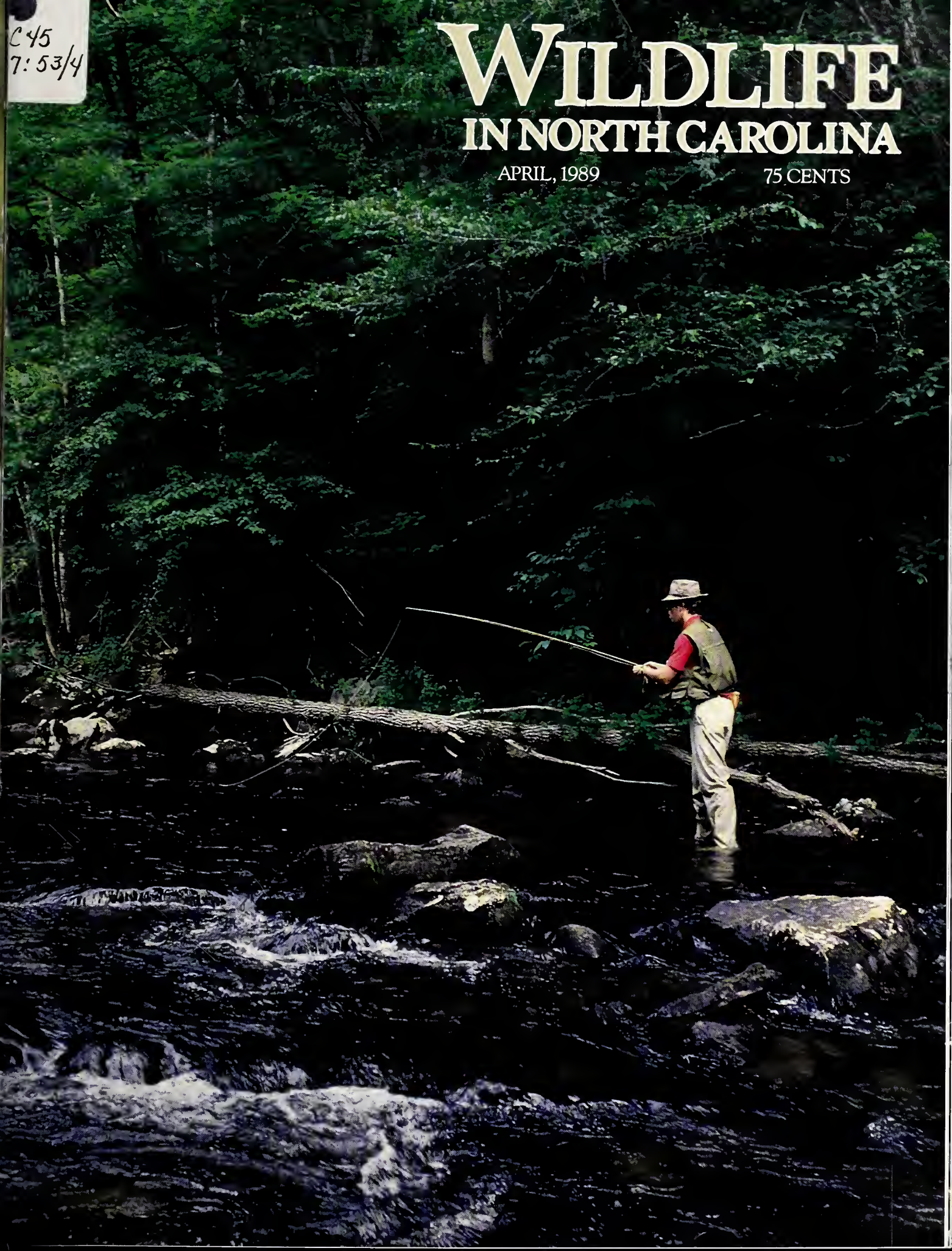
WILDLIFE IN NORTH CAROLINA

APRIL, 1989 75 CENTS



Rocks In The River

by Jim Dean

The heavy homemade river boat seemed barely to move against the strong, brown current. Lulled by the droning outboard and the first balmy days of the year, a trance would soon replace even the most intense excitement.

That, of course, is what my grandfather would wait for. Patience of Job. I think he must have looked forward to it all winter.

Running the motor from the back of the boat, he'd make sure you weren't watching, then reach out and yank on your line as it stretched past him back to the spoon wobbling somewhere in the thick water. The person holding the rod would set the hook and reel frantically until he began to smell a rat. A glance to the rear of the boat would confirm every suspicion—an innocent grandfatherly face staring off into space.

My brothers and I were suckers for the old fake strike trick, and it became part of our family tradition each spring when we'd greet the arrival of spring and the rockfish in the Roanoke River at Weldon.

Spring along the Roanoke was a busy, almost madcap, affair in the 1940s and 50s. Businesses closed, and crowds gathered to watch the fishermen and enjoy the seasonal aroma of high water, mud, fish and pulp mill waste. You could barely talk above the uneven roar of outboards. Cables and the floating docks creaked in the suck of thick current. There were distant shouts and laughter, and rimshots of wood striking wood as bow nets full of quicksilver came aboard. If you were lucky, you might get a bowl of rockfish muddle cooked in a huge cast iron kettle on the bank.

Beginning usually in late March or early April, the rockfish would arrive at their traditional spawning grounds at the foot of the Weldon rapids after a long trip upstream from Albemarle Sound, perhaps even the Atlantic. Weldon called itself the "Rockfish Capital Of The World," and most of us were grown before we learned that the more common name for this species is striped bass.

Sport fishermen would tie up to an overhanging limb and fish on the bottom using cut bait or bloodworms, although a few trolled spoons. Netters drifted downstream in boats with huge bow nets, attempting to scoop up the larger females and attendant bucks whenever they thrashed on the surface. We called them rockfish fights, but fighting was the last thing on their minds.

The rockfish could tolerate the pollution that was diluted by high water each spring during their brief stay. The river was a stinking mess back then, largely because of raw pulp mill waste dumped upstream at Roanoke Rapids. Huge mats of brown foam collected in eddies, and you had to regularly clean your line of slimy bacteria that flourished on the pulp mill effluent.

Now, years later, the river is visibly much cleaner as a result of the installation of expensive settling basins that have greatly reduced the pulp waste. Yet the honored spring guests—the rockfish—have been in increasingly short supply over the past 20 years. In this month's issue, fisheries biologist Tony Mullis charts the relentless decline of rockfish in the Roanoke and Albemarle Sound, and details the long years of study by the N.C. Wildlife Resources Commission and others to find the cause. It's a fascinating story that reveals the incredibly complex life history of this species and the many things that have affected its prosperity. But the good news is that we finally seem to be getting somewhere.

While many influences, including various forms of pollution, may be contributing to the decline, one increasingly likely culprit is an old one that can be traced back to the impoundment of reservoirs at Buggs Island, Roanoke Rapids and Gaston. The successful spawning of rockfish at Weldon and survival of young rockfish far downstream depends upon favorable water flow in the river each spring. Studies indicate, however, that earlier agreements to regulate these annual water flows need refining.

Already, steps have been taken to ensure improved water flows in this and future years, and regulations are in place to limit the catch so that more of the rockfish returning to spawn can do so. In addition, continuing studies of the Roanoke-Albemarle striper population are bringing us closer to other answers that may affect this important fishery. Perhaps it's still early to celebrate, but it's not too early to hope.

Many springs have passed since I stepped off a floating dock into a wooden river boat at Weldon, but I'm not alone in wanting to carry my children or grandchildren to the rockfish capital of the world again to see it as it once was.

Just put me in the back of the boat where I can reach those lines. I know what to do.

April, 1989
Volume 53, Number 4

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William W. Cobey, Jr. / Secretary

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Nature's Ways *by Lawrence S. Earley*

Back Of The Book *by Angela Dorman Hill*

Cover *North Carolina's swift mountain trout streams attract thousands of anglers each year. Photograph by Jim Dean.*

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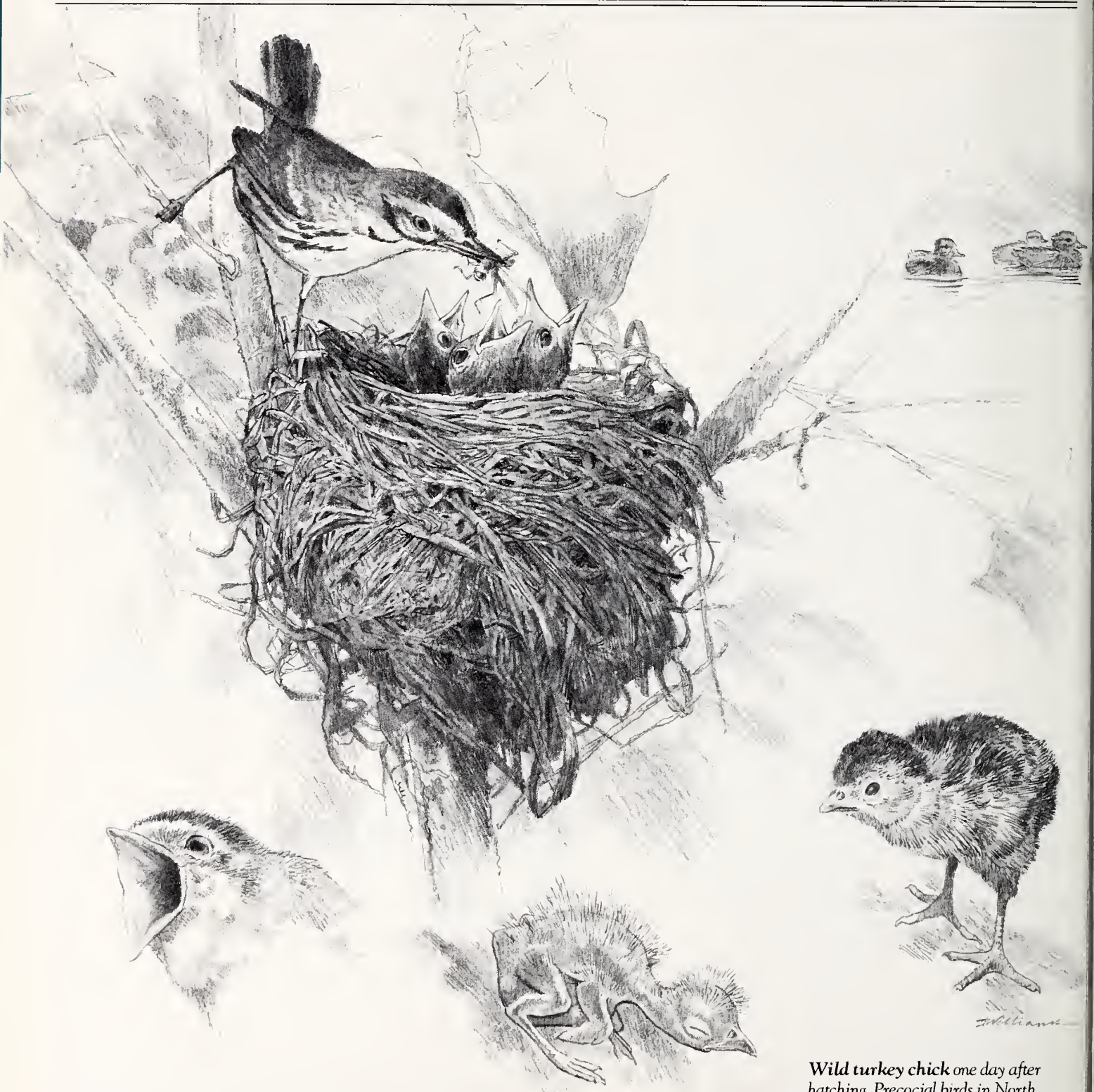
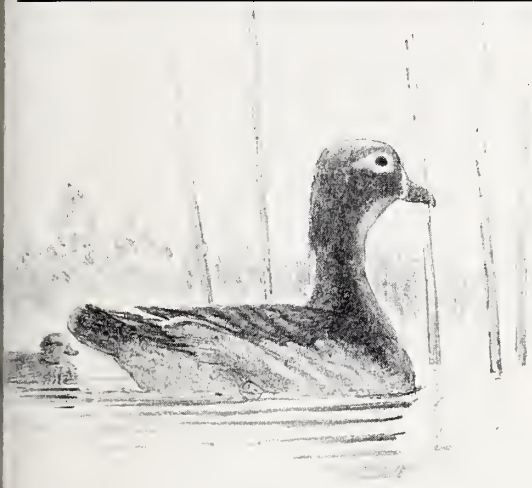


Many altricial *birds have bright-colored mouths or even light-reflecting bodies inside their mouths that stimulate feeding by the adults.*

Song bird *chick one day after hatching. Altricial birds in North Carolina: pelicans, cormorants, heron and egrets, raptors, pigeons, woodpeckers, kingfishers, swifts, hummingbirds and songbirds.*

Wild turkey chick *one day after hatching. Precocial birds in North Carolina: Waterfowl, grouse, quail, pheasants, rails, plovers and sandpipers.*



***The chicks of** precocial birds such as ducks are able to leave the nest almost immediately after hatching. The parents often point to food which the chicks pick up and eat. Altricial chicks, such as songbirds, are naked, blind and helpless after hatching, and the parents must feed them constantly.*

PRECOCIAL SPECIES		
Species	**No. Eggs In Clutch**	**Fledgling Period**
Common loon	2	0 days
Canada goose	4-10	0 days
Mallard	6-15	0 days
Ruffed grouse	11	0 days
Killdeer	4	0 days
Herring gull	2-3	0 days
ALTRICIAL SPECIES		
Mourning dove	2	13-15
Barn owl	6-7	60 days
Nighthawk	2	23 days
Chimney swift	4	20-30 days
Common crow	4-6	28-35 days
House wren	4-9	15-16 days
Robin	3-4	9-16 days
Cedar waxwing	4-5	15.9 days
Starling	4-6	14-21 days
Cardinal	3	9-10 days

(after George J. Wallace, *An Introduction to Ornithology*)

Bringing Up Baby

written by Lawrence S. Earley / illustrated by David Williams

Bringing up baby is a task that preoccupies more than two-legged mammals with mortgages. Wildlife species may not worry about the high price of college tuition, but they have had to develop sometimes complex ways of rearing their young that ensure a sufficient number of reproducing adults.

Indeed, birds have not just one "strategy" for raising young, but two. Consider the wood duck, for instance. Within hours of hatching, the brownish, down-covered chicks are a bright-eyed, alert, and noisy bunch. After a single night with her chicks, however, Mom leaves the nest and encourages her brood to join her on the pond below. Though barely 24 hours old, the chicks clamber out of their nest, and flutter down to the pond surface. Instinctively, they begin to swim. Within a few days, they can find their own food.

How different is the early life of a sparrow. When the sparrow chick hatches it is naked, blind and helpless, with barely enough strength to hold its head up and its mouth open. It will require constant parental feeding for several weeks. Only after this heroic attention will the chick be able to leave the nest, and even then it will require care from its parents until it can feed itself.

Nearly all birds fall into these two classes. Those that leave the nest quickly are called "precocial" birds; those that are helpless and nest-bound for a long time are called "altricial" birds. (See illustration for a list of representative species.) A quick exit from the nest is advantageous to precocial birds because many of them nest on the ground where predators lurk. Most altricial birds nest in trees where they are better protected. Precocial birds are able to flee the nest so quickly because they have undergone more of their development within the egg.

Precocial birds are hatched "well done," in other words. Indeed, one Australian bird hatches fully feathered and can fly within hours! To accommodate this extra development, the eggs of precocial birds are generally larger than those of altricial birds. Within these large eggs, the birds form fully developed sense organs, legs and other organs that will help them move about and feed. They have more yolk in the egg—their eggs may be 35 percent yolk by volume, compared to 20 percent for altricial birds. More yolk means that some of it remains in the bird's stomach after hatching, nourishing the chick for several days and reducing its need for an immediate feed.

Altricial chicks may be helpless after hatching, but they make up for it—and fast. An incredible metabolism makes them eating machines for days on end—the house wren has been observed feeding its young over 400 times a day! Constantly feeding, the altricial bird grows faster than its precocial kin. Altricial birds are also quicker to regulate their internal thermostat, requiring fewer days of parental brooding to warm them.

The more active wood duck chick isn't superior to the helpless robin chick, nor is the reverse true. The goal of all birds, fish and wildlife species is to bring the highest number of young through the vulnerable stages of infancy. You might say that precocial birds put their money on locomotion and a longer infancy. The altricial birds, on the other hand, are betting on faster development and thus swifter independence. As with people, there's more than one right way to raise a young 'un.

Wild Trout, Weird Trout

Wild trout in most Southern Appalachian streams behave almost exactly the opposite of their brethren elsewhere. But why? And what difference does it make to fishermen?

written and photographed by Jim Dean

A tactic that works well for wild trout like this handsome brown is the use of two flies — a high-floating, visible dry fly trailed by a nymph, black ant or other sinking fly.

My old friend A.J. Johnson of Winston-Salem began to get serious about trout fishing when he returned to North Carolina in the late 1930s. He had spent part of The Great Depression panning for gold in California's Trinity Alps and developed a taste for trout caught in the western rivers. Since Johnson never found the mother lode, it was often a choice between beans or trout.

"When I got back to North Carolina, I first started fishing with bait and spinners, but sometime after the 1940 flood, I got interested in fly fishing,"said Johnson. "There were durn few fly fishermen on our mountain streams back then, but I would occasionally run into someone using a fly-rod. Most were old-time mountain fishermen, and they fished wetflies downstream — usually two or three snelled flies tied on droppers off the leader.

"They'd creep along, trying to stay hidden, and cast into the runs and pools, then 'work' the flies back upstream. Sometimes, they would let the trailing fly drag in a swift tongue of current and bounce the top fly on the surface. The trout would jump all over that bouncing fly."

Johnson began using the same tactics, but over the years, he also began to add a few wrinkles of his own. He didn't have access to the many books and instructional articles available to fishermen today, and in some ways, that may actually have been an advantage. Rather than try to adapt tactics developed in Europe, New England or somewhere in Montana to our very different Southern Appalachian streams, Johnson had to develop his tactics based on observation, experience and trial and error.

"I hate to say it, but you can take a lot of what you read about trout fishing with a grain of salt, maybe a shaker full," says Johnson. "It's not that it's necessarily invalid, but it may not fit the conditions you find on the streams you fish. You're often better off figuring some things out for yourself."

One of Johnson's favorite stories illustrates the point. One day years ago, he was fishing a fairly remote wild brown trout stream in western North Carolina when he rounded a bend and found a fellow sitting on a rock. It was about mid-afternoon, and Johnson had already caught a lot of trout.

"How are you doing?" Johnson asked him.

"Oh, I'm not fishing yet," said the angler. "I'm waiting for the evening hatch."

Johnson still laughs about it. "He was wasting hours of good fishing waiting for

something he'd read was supposed to happen. I couldn't convince him that a big hatch of mayflies was simply not going to come off that creek at dusk or any other time, so I left him sitting there, and went upstream.

"I'll bet I caught 30 trout that afternoon," Johnson snorted, "and danged if he wasn't still sitting there waiting for the 'hatch' when I came back downstream just before dark."

Anybody who has spent much time fishing the freestone streams of western North Carolina — particularly those inhabited mostly by stream-bred trout — has already

learned that our trout don't always respond favorably to classic, textbook techniques.

In the first place, trout in North Carolina—especially brown trout—give new breadth and dimension to the term "spooky." Trout are considered wary almost everywhere, but generally speaking, trout in the classic streams of the Northeast, the limestone streams of Pennsylvania, and the brawling rivers and delicate spring creeks of the West are downright friendly compared to the wild trout in most small, freestone streams in the Southern Appalachians.

Fishermen from other areas who visit our streams are often amazed to find that they cannot spend a leisurely afternoon fishing one pool. The moment a wild Appalachian trout even suspects you are there, he scoots for cover and is very likely to stay there for hours, sometimes the rest of the day.

Because of this, experienced Southern Appalachian anglers learn to stay hidden, stalk carefully and fish quickly, covering perhaps several miles a day. Furthermore, if a fisherman is ahead of you on the stream, you might as well stop fishing and try to find an unoccupied stretch.

Several years ago, I shared a pool on a

***Clear, placid** pools may be too pretty to pass up, but you rarely get more than one or two casts in such a spot before the trout are spooked. Your chances are somewhat better on overcast days, at dawn or dusk, or when the water is high and murky or rippled by wind.*

***A.J. Johnson** leads a nice brown trout to the net. Chances are he fooled the trout using a two-fly rig that's been his favorite for many years.*

small limestone stream in Pennsylvania with a fisherman who told me he fished that stream almost every day. For at least 30 minutes, he stood within 20 feet of a feeding rainbow and made cast after cast. Although the stream was not stocked, its trout population had grown accustomed to anglers, and the rainbow seemed almost totally unconcerned with the angler's presence until he made a particularly sloppy cast, slapping the line down hard over the trout's head. The trout moved about 6 feet to another spot, and resumed feeding.

"Boy, they sure are spooky in this creek, aren't they?" said the fisherman. I didn't have the heart to tell him that in most North Carolina streams, he would seldom even see a trout unless it had already seen him and was streaking for cover, much less stand beside it and cast for 20 minutes.

Why are wild trout in Southern Appalachian streams so much more wary? Most likely it's a combination of things. Fishing pressure may condition some trout to tolerate anglers, but pressure alone is not the whole story because some of our streams get plenty of pressure, yet the trout still remain wary. We may never know all the reasons, but the availability of food seems to play a role.

Throughout much of the nation where trout are found, streams are much richer than they are in the Southeast. The limestone streams of Pennsylvania have such high pH that they generate an incredible abundance of trout food and may support an average of over 200 pounds of trout per acre. Indeed, some streams in the North and West can support a whopping 700 pounds of trout per acre.

By comparison, many of the freestone streams of the Southern Appalachians support only 10 to 20 pounds of trout per acre, and the relatively few streams that support more pounds per acre are almost invariably enriched by organic effluent from upstream hatcheries or other sources. (This, by the way, is one reason acid rain poses such a threat to Southeastern streams. Increased acidity lowers the pH, and the pH in our streams is already relatively low. If it falls much lower in many streams, it could greatly affect insect life and trout populations.)

Where food is abundant, trout often lock into a selective feeding pattern, and feed so intently that they tend to be more tolerant of anglers. And if that's true, it seems to follow that wariness may be partially related to the availability of food.

With less food for trout in our streams, anglers seldom encounter the classic blizzards of hatching mayflies, caddis or stoneflies found in streams elsewhere. By necessity, our trout are opportunists, feeding on a wide variety of foods, often taking what they can get when they can get it. And since there are seldom big hatches of specific insects, the trout are less apt to lock into a selective feeding pattern.

That brings us back to the business of hatches and Johnson's experience with the waiting angler. Johnson learned early that on most of our streams, it doesn't pay to wait for a classic hatch of insects. Indeed, even on a day when the trout are feeding and easier to catch, you're not likely to see lots of fish rising. To counter this, the Southern Appalachian angler learns to read the water and fish the most likely spots even when he sees no feeding trout.

Obviously, with spooky unselective

trout, you have to take extra pains to remain undetected. That may mean approaching a likely spot on your hands and knees, and making sure the first cast is presented carefully and accurately. Wearing drab clothing is a definite plus.

Unless the water is high and murky, you're not likely to catch more than one trout out of a good spot, and indeed, if you don't get a strike after you think you've covered the best places with a half dozen casts, it's time to move upstream and try the next run or pool.

Don't be surprised if you have more consistent luck in the deep chutes, runs and fast pocket water. The trout are less apt to see you from such spots, and you can often fish these places without crawling. Experienced fishermen will concentrate on such water, taking a bit more time to fish thoroughly. You can almost always pick out a beginner because he skips this productive water and tries his luck mostly on the big pools where he's far more likely to scare a trout than catch one.

I once spent nearly 30 minutes trying to get into just the right position to make one good cast to a nice brown that was rising in a quiet side-current in a big pool. When I poked my rod through the last tangle of rhododendron to make the cast, the trout saw that slight movement from two dozen feet away and vanished like a ghost. We won't stop fishing the pools, of course, and sometimes we'll get lucky, especially at dusk, on overcast days, or after a rain when the water is high and roiled. But fishing pools teaches you to appreciate the easier fishing you find in the faster water between them.

Learning to deal with wary trout may be a chore, but selecting the right fly is often much simpler. If you find trout feeding regularly and selectively, by all means try to learn what they're feeding on and match it. But if that's not the case — and that's about 90 percent of the time — it won't make much difference what you use.

The dry flies that work best day in and day out on North Carolina's streams are fairly standard patterns that are easy to see. You can't properly fish a fly you can't see, and it's often tough to see a size 18 red quill or Adams on swift currents. Such flies will catch fish, but you're likely to catch more fish — especially if you're a beginner — by sticking with high-floating, visible patterns like the Wulff Royal, blonde Wulff or grey Wulff (all have hair wings). An Irresistible or elk hair caddis is also excellent because both float well and are visible. On most days, a size 12, 14 or 16 dry fly will be the ticket. If you're not catching trout on one of these patterns in the swifter portions of the stream, you're doing something else wrong, or somebody is ahead of you on the stream.

The exception to this general rule occurs on quiet pools where smaller, darker dry flies like the Adams will often work better. The trout have more time to inspect the fly, and they are apt to be more particular. Floating terrestrial patterns like ants and beetles are also especially good on pools where they're more visible.

Though wet flies have fallen into disfavor since Johnson first began fishing, they still work, and nymphs are even more effective, although they should be weighted so that they sink in the swift currents typical of our streams. There are many nymph patterns, but the muskrat nymph, Zug Bug and Tellico rank among the local favorites. In general, dark nymphs seem to produce more consistently, and Johnson's all-time favorite is really nothing more than a bluegill fly — the hard-bodied black ant. It's particularly deadly on wild browns.

You should also know about one of Johnson's adaptations from the earlier "cast" of multiple flies used by old-timers. It has proven so deadly that not only does he use it most of the time, so do all the anglers he's taught, including yours truly.

Johnson fishes two flies at the same time — a dry and a sinking black ant. He ties the dry fly — usually a size 12 Wulff — on the end of his leader, then ties a second 12- to 15-inch length of leader into the eye of the Wulff alongside the first knot. He ties the ant on the end of this trailing leader. He fishes this tandem upstream, and catches as many trout on the dry fly as he does on the ant. The dry fly floats naturally, while the ant sinks, and the floating fly also helps signal strikes on the ant.

The key to this technique is tying the trailing leader into the eye of the dry fly. It's far better than the more common tactic of hanging the dry off the leader on a short length of monofilament called a dropper. The dry fly on the dropper is more likely to tangle, and more important, it doesn't float properly. Incidentally, casting two flies is not difficult, and you won't have nearly as many tangles as you'd expect as long as you don't rush your forward cast.

Since Johnson taught me this tactic, I've found that you can also use combinations of flies rigged this way for lots of fishing conditions. Into a caddis hatch? Try an elk-hair dry caddis as the floating fly trailed by a sinking caddis pupa. Want a dun trailed by an emerging nymph? A hopper trailed by a small beetle? No problem. The combinations are endless, and incredibly effective. I've used such tandem rigs not only in North Carolina, but also for picky trout in the toughest limestone streams of the Northeast, as well as many big western rivers. Despite warnings from our guide that it wouldn't work, several of us caught lots of trout in the Madison River in Montana one spring using a dry stonefly pattern trailed by a weighted stonefly nymph.

That incident may prove only that there are always exceptions. And the Southern Appalachian trout fisherman is facing one of the biggest exceptions of all — a trout that will eat most any fly you use, but is so spooky you can barely get close enough to serve it to him.

***A careful** approach is particularly important in Southern Appalachian streams. This angler is using a rock as a shield while fishing the tail of the pool.*

A Partnership That Protects

A partnership between private groups and state government is playing a big role in funding the protection of unique natural areas like the Walcott Tract in North Carolina.

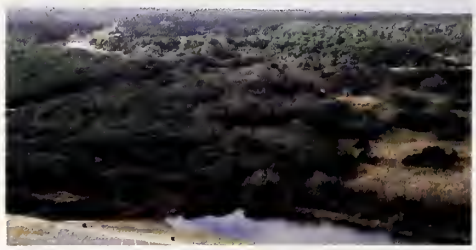
by Lawrence S. Earley

The latest game-land acquisition by the N.C. Wildlife Resources Commission has brought enthusiastic praise from hunters, hikers and others interested in the outdoors. Last summer, the Commission put a down payment on the "Walcott Tract," a 585-acre piece of land that sits on Cove Creek, a tributary of the Green River in Polk County. The land lies between two other Commission-owned tracts that are part of the 30,000-acre Green River Game Land.

Conservationists and sportsmen are delighted not only with the purchase, but with the way the funding came about. The source of the down payment was the fledgling Recreation and Natural Heritage Trust Fund, a piece of state legislation that bears much promise for the protection of important natural areas in North Carolina.

"We're tickled to death with the purchase," says Dick Hamilton, assistant director of the Wildlife Commisison. "The Walcott Tract is a beautiful old mountain hardwood forest, valuable for deer, turkey, bear, squirrel and nongame species. It's open to hunting and it'll be an integral part of the Green River Game Land."

According to the state's Natural Heritage Program, which had registered the property as a N.C. Natural Heritage Area, the Walcott Tract is valuable for other reasons. It sits on one of the rugged gorges descending the escarpment of the Southern Blue Ridge Mountains, and contains sections of old-growth and mixed-age hemlock, hardwoods and pine forests. Several rare plant species in the forest distinguish it as well. The tract has long been used by the schools in the area for environmental and conservation education purposes.



KEN TAYLOR

Hamilton says that the Wildlife Commission was fortunate to purchase the land. "We tried to buy it with federal funds, but we couldn't get enough excess money together. And it was a good price."

Enter the Recreation and Natural Heritage Trust Fund. The Trust Fund was established by the 1987 General Assembly to award grants to state agencies for the acquisition and management of lands of special value as well as for inventories of endangered ecosystems. Last summer, the Trust Fund awarded the Wildlife Commission $65,000 for a down payment on the Walcott Tract.

"We'll be able to complete the purchase in three more installments, thanks to the initial award from the Trust Fund," says Hamilton. "We're just very glad to get it off the ground."

The Trust Fund embodies a unique sense of partnership between state government and private conservation groups. It represents an extended hand to those private conservation groups that are trying to protect natural lands of special value.

"The need in North Carolina to protect biological diversity is greater than the private sector can accommodate," says Katherine Skinner, director of the N.C. Nature Conservancy, which championed the bill's passage. The Nature Conservancy is a nationwide conservation organization that has acquired almost 3.5 million acres of natural lands throughout the United States, including 311,621 acres in North Carolina.

"We estimate that it would take $32 million to protect the 100 top natural areas in the state," she says. "The Trust Fund enables the state to participate actively in the protection of natural areas. It puts money where the need is."

The Trust Fund works this way: A state agency can apply for funds to acquire additional state parklands, forests, fish and wildlife management areas. It can use the grants to purchase easements or buy the land along wild and scenic rivers, or it can use the money to create nature preserves, all of which are to be accessible to the public. The money can also be used for inventories of special areas or natural ecosystems.

A nine-member board, appointed by the Governor, Lieutenant Governor and Speaker of the House, reviews applications and then makes the awards. The Wildlife Commission was not the only beneficiary of the Trust Fund. Four other grants, totaling $205,000, were awarded to two other state agencies:

- The N.C. Division of Coastal Management won a grant of $80,000 that, with other funds, enabled the agency to purchase 175 acres of Buxton Woods, the largest maritime forest remaining in the state. The purchase will help preserve the aquifer underlying the Buxton Woods and protect the 950-acre tract within the Cape Hatteras National Seashore.
- The N.C. Division of Parks and Recreation was awarded a grant of $98,000 to buy easements on more than 50 acres along the New River in Ashe and Alleghany counties. The easements will preserve the view along one of the most picturesque sections of the ancient river. It will also protect the woodlands surrounding the public access to the river from U.S. 221.

Also, funding for two inventories of endangered ecosystems was granted to the Natural Heritage Program of the N.C. Divi-

ALAN WEAKLEY

***The Wildlife Commission** added a 585-acre tract near the Green River (above) to the Green River Game Land, thanks to a grant from the Recreation and Natural Heritage Trust Fund. The Trust Fund provides money to state agencies to protect important natural areas. The Fund also financed the purchase of a portion of Buxton Woods (left), one of the last of the state's maritime forests.*

sion of Parks and Recreation. Biologists will systematically investigate the Coastal Plain to identify high-quality remnant longleaf pine forests and their populations of rare plant and animal species. Another team of biologists will study bogs, fens, swamps, marshes and other rare mountain wetland ecosystems that have escaped draining.

"It's a wonderful start," says Skinner. Each of the projects was on the Conservancy's priority list for protection. She's especially enthusiastic about the way the grants supplemented or "levered" already existing appropriations. The money spent on land acquisitions — less than $250,000 — was used to protect land valued at $1.9 million.

"That's a whopping leverage!" she says. "The $80,000 for Buxton Woods was only a small part of the $850,000 purchase price for the tract, yet it was the last $80,000 the Coastal Management Commission needed and they had nowhere else to get it."

Unfortunately, a clock is ticking on the life of the Trust Fund. A special appropriation provided $275,000 for the Fund's first two years, but no continuing source of funding was allocated. Worse, a "sunset" provision was tacked onto the bill that effectively kills it after 1989.

"The Trust Fund is a wonderful concept," says Katherine Skinner. "It helps advance the mission of protecting the natural areas of North Carolina which is what the Nature Conservancy is in the business of doing. It's a new idea, and we've had one round of expenditures and they were certainly very good, viable projects.

"It's too early to tell what'll happen during this session of the Legislature. But we'll be making a case to terminate the sunset provision and have the General Assembly put more money into the Fund."

Dick Hamilton says that the Wildlife Commission supports the Trust Fund and hopes that it will win a reprieve this spring. "There were many worthwhile projects for the awards the first time around, but only a few hundred thousand dollars to spread around. As an agency that has benefitted from the Trust Fund, we support its continuation and we hope it gets expanded funding." ⊠

JIM DEAN

Tim Biesecker *lands a striper in one of the upstream reservoirs on the Roanoke River. Yet, while landlocked striped bass are generally doing well in North Carolina, free-ranging striper populations in the lower river and Albemarle Sound have declined in recent decades.*

JIM DEAN

A cast net *is used by many fishermen in lakes to capture live bait. Sometimes catching the bait is at least as difficult as catching the stripers.*

Can Stripers Turn The Corner?

After years of study, biologists are beginning to unlock some of the mysteries of our dwindling striped bass populations in Albemarle Sound and the Roanoke River, and river flows during spawning may be one of the keys.

by Tony Mullis

When the rockfish were running each spring, you could walk across the river on the boats without ever getting wet." That's what fishermen used to say about the striped bass fishing in the Roanoke River until the 1970s. And it certainly was spectacular at times. The town of Weldon called itself "Rockfish Capital of the World." These days, however, that label seems a bit ironic when good fishermen have had to work hard to catch their three-fish limit.

What's happened at Weldon in the Roanoke has also happened downstream in huge Albemarle Sound because the river is the sound's striper nursery. When striper reproduction fell in the river, the striper population also dropped in the sound, and is now holding on with the help of stocking.

Stripers are beset by adversity at every turn in their life cycle, and at times it has seemed that the Roanoke/Albemarle fishing might disappear for good. Can the stripers in the fishery recover? After years of study, some clues are emerging that give hope.

Regardless of whether you know it as the striped bass, rock fish or just rock, the striper is one of the most important recreational and commercial finfish species to be found in eastern North Carolina, particularly in the Albemarle Sound region. By far, most of the striped bass caught by both sport and commercial anglers from unimpounded coastal waters come from Albemarle Sound and its numerous tributaries.

To understand what's happened to the stripers, and what the possible solutions might be, it helps to know how the fish reproduce naturally. Since the Albemarle Sound population of striped bass spawns in the Roanoke River, most spawning occurs near Weldon during years of normal water levels. The spawning act is locally referred to as a "rock fight" during which one female is followed by several competing males. The fish broadcast their eggs and sperm loosely into the water and the eggs are fertilized. After absorbing water, the semi-buoyant eggs suspend in water with a slight flow and the eggs drift downstream with the river current and hatch in about two days near the towns of Palmyra and Hamilton.

JIM DEAN

***The decline** in the striped bass population in the Roanoke River and Albemarle Sound has received considerable study in recent years. Biologists have uncovered new evidence that river flows may be an important factor.*

For the first few days after hatching, the striped bass larvae are washed downstream to the delta area at the river mouth. By this time, the young fish have absorbed a large part of their yolk sacs, their sole energy source during the period immediately after hatching. Their mouth parts are beginning to form, and they soon begin searching for food. Young striped bass must begin feeding within four to seven days after hatching or their chances for survival are very poor. The young stripers begin feeding while still in the river delta area on small invertebrates called zooplankton. They soon move with the river current into the primary nursery area of western Albemarle Sound where they continue feeding on zooplankton and larger crustaceans, insects, and small fish. Most mortality of young striped bass occurs between the time of hatching and midsummer.

Except during that brief spring spawning run adult stripers that aren't landlocked spend the rest of their lives in brackish or salt water. Fisheries experts do not all agree on whether a significant number of striped bass produced in the Roanoke River leave Albemarle Sound and enter the Atlantic Ocean to join the great migratory striped bass schools of the Atlantic that are composed primarily of stripers produced in Chesapeake Bay and the Hudson River.

From the time they attain legal harvestable size, striped bass are subject to intensive commercial and recreational fishing pressure. Human development in the watershed also increases the input of pollutants, nu-

JANE ROHLING

***Fisheries biologists** at the Wildlife Commission's Fayetteville hatchery add milt from a male striper to fertilize roe from a ripe female. The young stripers can be raised in hatchery ponds and stocked. In massive bodies of water like Albemarle Sound, however, reproduction in the wild is the key to an abundant population.*

trients, and sediments that deteriorate water quality. Also, increased demands for use of the water further degrades striped bass habitat. Such pressures tend to mold all fish populations, and there is evidence that they may be destroying the Albemarle Sound/Roanoke River striper population.

During the mid to late 1970s, commercial and recreational fishermen began to complain that catches of striped bass in the system were diminishing, but most fish and other wildlife populations rise and fall in natural cycles — stripers, too. Researchers have followed "boom and bust" striper patterns in Albemarle Sound for many years, and this striped bass population had experienced unusually good reproductive success in the late 1960s and early 1970s. Managers expected populations to fall to lower levels after those banner years and were not alarmed at first about reports of lower catches. But as the catches continued to decline, other biological indicators began to suggest that this was not a routine cycle.

Dr. W.W. Hassler of North Carolina State University and his students have been studying the Albemarle Sound/Roanoke River striped bass population intensively since the mid 1950s. Dr. Hassler began evaluating reproductive success in 1956 by annually sampling for the juvenile striped bass produced during the spawning season. He used a trawl towed in the western Albemarle Sound nursery area during the months of July through October. A juvenile abundance index (JAI) was calculated by dividing the number of juvenile stripers caught by the time spent towing the trawl.

The Albemarle Sound striped bass JAI has fluctuated widely over the years, but reproductive success was good every two to five years before the late 1970s. Beginning in 1978, reproductive success dropped far below the historical ranges. Although reproduction rose to a mediocre level once in 1982, success has not been good since 1976, and it has been negligible in most recent years.

Another indicator of a problem is striped bass egg viability. A viable egg is simply one that is alive and continuing to develop. Egg viability, again measured by Dr. Hassler, fluctuated somewhat but ranged from about 80 percent to over 90 percent from the 1950s through 1974, but it dropped in 1975 to 55 percent and has remained below historical ranges through 1987. In 1984 only 23 percent of the striped bass eggs collected were alive and developing normally.

The declining catches by fishermen have also persisted through the 1980s, though some reduction in catch was due to regulatory restrictions on sport and commercial fisheries. Still, the poor harvests support the realization that the Albemarle Sound striped bass population is experiencing major problems, problems that must be resolved if the fishery is to be restored.

Early research efforts into the cause of the reproductive failures focused on the cause and effects of the reduced egg viability. During the spring of 1980 the N.C. Wildlife Resources Commission conducted a study of the effects of selected organochlorine pesticides and heavy metals on the survival of eggs and larvae, but results of the study indicated that contaminants in the water of the Roanoke River did not reduce the survival of eggs and larvae after they were spawned. Also, it was concluded that contaminants in the male parent stripers were not responsible for lowered egg viability. The study did indicate, however, that high concentrations of some contaminants, including arsenic and dieldrin, in the unfertilized eggs were related to lowered survival rates of larvae. Also, the concentrations of many contaminants in the eggs or adult fish were higher in older and larger female striped bass.

But the cause of the lowered egg viability could not be positively attributed to any of the contaminants studied. Other studies by the Wildlife Commission concluded that despite the reduced egg viability, enough larvae were still being produced to provide acceptable reproductive success. As a result, the focus of research has shifted to finding the cause of excessive mortality between the time of hatching and juvenile life stages.

In 1982, the Institute of Coastal and Marine Resources at East Carolina University was enlisted in the search for the cause of larval mortality. Dr. Roger Rulifson has directed most of ECU's studies of Roanoke River striped bass since they began. Predation of larvae by other finfish was speculated to be a possible cause of low larvae survival, but ECU studies determined that predation was not a major contributor to larval mortality.

Meanwhile water-quality conditions in the Albemarle Sound area were undergoing severe degradation with extensive blooms of blue-green algae occurring in the Chowan River and western Albemarle Sound most summers in the late '70s and early '80s. These algae can suppress green algae populations upon which zooplankton — the forage organisms preferred by striped bass larvae — are dependent for food. Managers felt that this might be interrupting the striped bass larval food chain.

Dr. Rulifson and his colleagues found that zooplankton abundance in western Albemarle Sound was low in comparison to other estuaries with striped bass populations, and larval striper stomachs contained few or no prey items. Further research in the laboratory with fed and unfed larvae showed that starved larvae exhibited abnormal organ development with degeneration of many body tissues. Since the timing of first feeding of larval striped bass is critical to their survival, research was begun to investigate the early feeding characteristics of the recently hatched fish. The purposes of this re-

KEN TAYLOR

***A mild electric** shock can temporarily stun stripers so that some of them can be tagged, studied or gathered for use in hatchery reproduction.*

search were to determine the specific zooplankton prey items selected by the larvae and the abundance of that prey, as well as the abundance and kinds of algae available for the zooplankton to feed upon. Also, researchers waited to determine the location in the river where these factors were important.

This research will continue through the spring of 1989, but the results obtained thus far have turned up an old problem — river flows. River flows may be crucial for larval survival, and can affect stripers at several different points in the reproductive cycle. Relatively high flows are thought to be important early in the spawning season because they attract migrating adult fish to the spawning grounds. Flow rates also control the actual time of spawning. Low water levels usually warm quicker in the spring spawning months while high water levels stay cooler. Striped bass spawning activity peaks at about 60°F, and when water temperatures are favorable and spawning activity is high in the Roanoke. However, a sudden rise in water level usually brings a halt to all spawning, probably because the rising water is slightly cooler.

Flow rates also are responsible for the transport of eggs and larvae downstream to the nursery area. During the period eggs are drifting, high flows can wash eggs and larvae into adjacent swamp bottomlands where they can settle out and become stranded. However, extremely low flows can cause eggs to drop out of suspension and suffocate in the mud of the river channel itself.

Since 1984, Dr. Rulifson and his associates have found that river flow had even more influence on striped bass larvae and their survival than was earlier thought. Ideally, flow controls the rate of downstream transport of eggs and larvae so that larvae arrive in the area of maximum zooplankton abundance when they are in feeding condition. During periods of high flow, larvae and even eggs can be washed through the river delta area and into Albemarle Sound where zooplankton abundance is low before larvae develop into feeding condition. High flows also dilute zooplankton concentrations in the lower river and western sound areas. On the other hand, extremely low flows can cause eggs to hatch so far upstream that larvae must begin feeding long before they reach the area of highest zooplankton abundance. Evidence also suggests that high flow rates in late winter and early spring wash nutrients into the river which stimulate blooms of green algae and zooplankton later in the season.

Flow rates in the Roanoke River are controlled by releases of water from three dams located immediately upstream from the spawning grounds. Kerr Reservoir and Dam was constructed in 1952 and is operated by the U.S. Army Corps of Engineers for flood control and hydroelectric power generation. Water released from Kerr Dam

PETE KORNEGAY

***The prime** natural spawning area for Albemarle Sound's striped bass is located below the Weldon rapids on the Roanoke River. During the spring spawning period, water flows from upstream reservoirs will be managed more carefully in the future to provide ideal striper spawning.*

flows into Gaston Lake and Roanoke Rapids Lake which are operated by Virginia Electric and Power Company for power generation.

The construction of these dams in the 1950s and early 1960s drastically altered the natural flow of the Roanoke River, and many conflicting uses of the Roanoke River stimulated the formation of the Steering Committee for Roanoke River Studies in 1955. This organization was composed of various governmental agencies and private interests, and it developed a set of recommendations to resolve conflicting interests and maintain river conditions to permit multiple use. The recommendations included provisions for striped bass spawning which have been supplemented by an agreement since 1971 between the Corps, the power company and the Wildlife Commission. This agreement provides for the maintenance of minimum flows to the striped bass spawning grounds during the spawning season, depending on the availability of stored water. However, the agreement did not address maximum flows, and the restrictions on changes in water releases were minimal. This has allowed river levels to change many feet within a few hours, usually in response to peak power demand and generation. At times, these changes have had disastrous effects on striped bass spawning activity.

Furthermore, the city of Virginia Beach has requested that it be allowed to augment its municipal water supply through a pipeline to Lake Gaston with water withdrawals projected to be 60 million gallons per day. This will likely cause further changes in river flows.

What's being done about the river flow problem? Realization that Roanoke River flows are critical to the reproductive success of the striped bass population and that they have not been managed optimally for striped bass or several other downstream interests led to the formation of the Roanoke River Water Flow Committee in early 1988. The committee is chaired by Dr. Rulifson and Dr. Charles S. Manooch III, a fishery biologist with the National Marine Fisheries Service. Like the earlier steering committee, this committee consists of representatives from various state and federal agencies and private interests, but it also includes scientists from regional universities and advisors from the Virginia Electric and Power Company and the Corps of Engineers.

"Flows are especially critical to striped bass in the Roanoke River because this is one of the few naturally reproducing coastal populations that spawn in pure fresh water," said Dr. Rulifson. "Most Atlantic Coast striped bass populations spawn in brackish tidally influenced areas where tidal flux keeps the eggs and young larvae in sus-

pension. Albemarle Sound stripers must spawn far up the Roanoke because the coastal barrier islands tend to minimize the effects of lunar tides in the sound and its tributaries."

The Water Flow Committee has attempted to provide for the various affected interests in the Roanoke River Basin, while emphasizing proper flows for stripers. The committee concluded that a flow regime similar to that which existed before the impoundment of Kerr Reservoir was nearly optimal for striped bass. Thus they requested a moderate flow rate with as little rapid change as possible during the 1988 spawning season, and the Corps and Virginia Electric complied to the best of their ability. Recommendations have been formulated for a future flow regime that begins with relatively high flows in early April, decreasing to more moderate flow rates as the season progresses through mid-June. The recommendations include upper and lower limits on flows, if climatic conditions permit, with a maximum variation rate. These recommendations will be incorporated into a report that will be completed in early 1989 and that will be used in renegotiating a new agreement between the Corps, Virginia Electric and the Wildlife Commission.

While river flows appear to be a major factor in the decline of the Albemarle Sound striped bass population, this has not been proven to be the sole cause of the decline. More likely, it's a combination of factors, any one of which may not have caused the decline by itself. Several relatively minor factors likely acted in concert to bring about the collapse of the Albemarle Sound striped bass stock.

"Water quantity and quality problems along with overfishing by commercial and recreational fishermen during the late 1960s and early 1970s depressed the striped bass population to a level from which it may not be able to recover on its own," said Lynn Henry, fishery biologist with the N.C. Division of Marine Fisheries. "Cumulative impacts of disease epidemics, periods of low oxygen, habitat alteration, blue-green algae blooms, and fish kills have also taken their toll on the population."

Intense fishing pressure has certainly affected striped bass stocks. Recent studies suggest the age composition of the Albemarle Sound spawning population may have shifted toward younger fish, an indication that overfishing is occurring. Recently collected evidence in Maryland indicates that the survival of eggs and larvae produced by younger striped bass broodfish is lower than that of older parent fish. Thus, losses in egg quality may have resulted from a shift in age composition toward younger fish and may be a critical factor in reproductive failure.

R. A. RULIFSON

***Special nets** are used to collect immature striped bass and also the food they feed on. Using such equipment, biologists have learned about the critical factors that affect spawning success and survival of stripers.*

The Albemarle Sound commercial fishery is the largest contributor to the striped bass harvest. Commercial fishermen harvested up to 10 times as many striped bass from the Albemarle Sound system as recreational fishermen in the late 1970s. Since that time however, the commercial harvest has declined and sport fishermen on the Roanoke River are now taking a higher percentage.

Recreational fishing pressure for striped bass in the Roanoke River is intense during the spawning season. These fish are caught directly from the spawning grounds often before they are able to spawn, a practice the Atlantic States Marine Fisheries Commission considers detrimental to the restoration of striped bass stocks.

Despite all the factors that have influenced the decline in stripers, the outlook for the Albemarle Sound population looks a bit brighter than it did even a year ago. Reproductive success was higher in 1988 than in any year since 1976, possibly because of improved water levels. The egg viability harvest from the Roanoke River was higher than it has been since 1979. All are indications that the spawning population is also increasing.

It is hoped that sound management practices have played a role in the restoration of this striped bass stock. In addition to working for improved water flows, the Wildlife Commission has reduced the daily creel limit, increased the minimum size limit, and imposed restrictions on the use of some fishing methods in the Roanoke River sport fishery. Also, the N.C. Marine Fisheries Commission striped bass regulations have provided for a reduced commercial season, increased minimum size limit, reduced sport creel limit, maintenance of an ocean closure, and to some extent the elimination of incidental catches. These measures have aided in relieving some of the fishing pressure on the striped bass stock, yet allow a multi-species fishery to continue in Albemarle Sound for other species.

Over 600,000 striped bass fingerlings have been reared and stocked into Albemarle Sound since 1981 by the U.S. Fish and Wildlife Service under a cooperative agreement with the N.C. Marine Fisheries, and the Wildlife Commission has assisted in that effort by providing fry and adult broodfish from its hatchery at Weldon.

Of course, one year of improved reproduction does not constitute a restored population. Careful research and wise management must continue if hopes of a restored fishery are to be realized. The Water Flow Committee will continue to refine the flow needs of striped bass after its report and recommendations are issued this year, and the Wildlife Commission and the Division of Marine Fisheries are developing a joint striped bass management plan in association with the U.S. Fish and Wildlife Service. State and federal hatcheries will likely continue to play a role in supplementing natural striped bass stocks. If all goes as planned, the years when Weldon could accurately call itself the "Rockfish Capital" may return. And if so, Albemarle Sound's stripers will also be back. ⊠

Garland Bunting, Coons & Dogs In The Night

"I love coon hunting. I don't know what it is about it, but it'll cause you to leave your happy home to hear a dog treeing."

interview by Lawrence S. Earley and Michael Zetts
photography by Ken Taylor

It's a long way from eastern North Carolina to the bright lights and city streets of New York City, but Garland Bunting seems to have made the jump better than most. In the past few years, Bunting's booming voice has startled and amused audiences of the David Letterman Show, "Good Morning, America," "57th Street," and the Larry King radio show. In last summer's baseball movie smash, "Bull Durham," he had a small but memorable part.

Which is to say that the Scotland Neck resident has been getting around. It all began when New York writer Alec Wilkinson spent several months accompanying Bunting on his rounds as an officer for the Halifax County Alcoholic Beverage Control. Wilkinson's account first appeared in the New Yorker *magazine, and the followup book* Moonshine: A Life In Pursuit of White Liquor *(1985) became a minor classic that turned Bunting into a celebrity.*

Yet despite the siren song of New York and Hollywood, Bunting still feels best in a Halifax County swamp in the middle of the night waiting for his hounds to tree a coon. "I'm a coon hunter!" he says with a rafter-shaking bellow, "and I love to coon hunt. I can't explain it, but it'll make you leave your happy home to hear a hound baying!" He bought his first coon dog when he was 15, and today five hounds camp out in his backyard. If people knew what he paid for a coon dog, he says, "they'd get up a committee to have me committed."

Bunting was born in Martin County 63 years ago this month. After growing up on a farm, he moved to Newport News, Virginia, to work in a shipyard and then served in the U.S. Army. In North Carolina, he worked for the state Alcoholic Beverage Control from 1953 until 1957 and has worked for the county ever since.

Wildlife in North Carolina *caught up with Garland Bunting in his home town of Scotland Neck early last spring. It was still cold. An electric heater ran almost continuously in Bunting's hunting cabin while we asked him about his life as a coon hunter.*

Garland Bunting *and his hounds negotiate a narrow bridge over a swampland near Sam's Head, outside of Scotland Neck. The swamp is one of the many places where he likes to hunt.*

I was born in Oak City, North Carolina, on April 23, 1926. That's in Martin County, 16 miles south of here. My daddy was a farmer. We grew peanuts, cotton, corn, tobacco. Raised a few hogs to eat, a cow or two, and raised our own vegetables. I had three brothers and we did most of the work. We burned wood in the house and cured tobacco with wood, so we cut all the tobacco and cut all the wood we burned. And me and my older brother had to do all that cutting.

It was tough country there. Some people really fared tough. They claim one man boiled the same peas until they petrified—he drank the soup off them. They said another old fellow was so tight that when a fly got in his sugar dish he run the fly half a day until he caught him and brought him back and sweetened his tea with that grain of sugar. I don't know whether I believe that, but that's what they said.

We hunted to eat back then. We'd eat all the birds, rabbits and squirrels we shot. Everybody did. One man in my county, he'd buy a box full of shells and if he didn't get 25 squirrels out of that box of shells he'd be the most disappointed man you ever saw. Because the only cash money he got in 12 months was 90 cents to buy a box of gunshells with. The rest of it was a trade book that he took to a grocery store. He told me, "I don't never shoot no squirrel 'til I see the whites of his eyes."

And now people talk about tight times.

Wiley died two years ago. But boy he was a hunter. He was a coon hunter and a squirrel hunter and a turkey hunter. He could kill a turkey, too. He told me a story about when he was a young boy, hunting a turkey one evening, late, and he shot the turkey and he laid his gun down and tried to catch him. Said he was three miles from where he left the gun and he ain't caught the turkey yet. And he never seen his gun no more. He said, "Let me tell you something, don't you never lay your gun down when you running no turkey." He said they could run faster wounded than a man can healthy.

For a sportsman, this country down here is paradise. You got good fishing, good hunting, good land to travel on. It's easy on a older man to hunt. It's easy on your dog, getting your dog back. It's easy fishing, getting your boats down to the streams and what not. I think it's a paradise for a sportsman. You got turkeys, you got quail, you got bobcat, you got deer, you got fox, you got rabbits. And all kind of fishing. You got rivers and creeks and lakes here.

I'm a coon hunter. I love to coon hunt. I don't know what it is about it, but it'll cause you to leave your happy home to hear a dog treeing, now. There's something about a hound baying. I think it must have been bred and born in me. Because there ain't nothing in this world I love other than hearing a hound strike a track and tree him. Work him like he ought to and then tree him like he ought to. I don't care if I go to the world's fair anywhere, ain't nothing in my system that I enjoy as good as I do coon hunting.

***Bunting has** bought, sold and traded many coon hounds in his life. Bunting's father tried to turn him against coon hunting. "That's ol' bad, hard, tough hunting," he said.*

To coon hunt you need hip boots and some good strong overalls and a good light and a good rifle—a .22 if you're going to shoot the coon. I don't shoot a lot of them. I shoot about every fifth one, you know. And then you need something to travel with, like a pick-up truck, maybe a four-wheel drive now, but you can take an ol' two-wheel drive. I still take a two-wheel drive on account of farmers complaining about you tearing the paths up with a four-wheel drive. Then you need some swampland. A coon don't hang around high land much, he needs to be around water. You don't strike many coons where there's no water. There's got to be a pond or a ditch somewhere where he can go and eat his food.

I like a swamp, a deep swamp, way back of a swamp. The further the better. I like to go so far back there the sun rises between me and the road, you know. You need a compass, too. And I mean you need a compass. I've hunted with people who say, "Oh, I know this woods." And in 10 minutes after they're in the woods they don't know where the hell they at. I'm telling you now. You need a good compass and you need to know how to read it. You need a snake bite kit if you're going to hunt during the fall.

You got to go at night. And you got to go the first part of the night. A coon comes down just about the first of dark and he'll feed 'til around 9 or 10 o'clock. Then he goes back. Then he'll start out again around 2 o'clock in the morning. Come back out

*"**You need** some swampland to coon hunt," says Bunting. "A coon don't hang around high land much. You don't strike many coons where there's no water."*

and feed again 'til day. And all the old timers used to tell me: old coon walks just before day. Lets everything get real quiet before he comes down. He lets the young ones come down, and if there ain't no dogs out there then he goes down. I don't know if that's true or not, but that's what we always say.

There's very few coon hunters, mister. There's a lot of folks out there with a dog in the nighttime, but they don't know what coon hunting is. They'll ride around a field and shine a light to see a coon's eye in a tree and go ahead and turn their dogs loose to see if they can find a track, you know. But that ain't coon hunting.

My pleasure is to drop a hound and see him strike that track and trail it and work it and tree the coon.

I like a dog with a good mouth. I want 'em to give a good tongue on the trail and also when they get to the tree I want 'em to have a good mouth so I hear 'em a long way. It's valuable, you know. When your dog gets in there two or three miles, he needs to have a foghorn on him so you can get to him. A good treeing dog will sit there all night. He bawls when he goes up the tree, but then he goes into a chop — "Ow, ow, ow." And he'll stay there all night long. You don't see how in the world he does it, but he does it. I've seen 'em tree from 7 o'clock at night to 7 o'clock in the morning. In the water where I couldn't get to him, you know.

A coon dog's got to be a strike dog, track dog and tree dog to be considered a coon dog. He's got to be a "straight dog," too. What we call a "straight dog" is one that won't run anything but a coon. Not run a fox or deer or bobcat or coyote, you know. He got to be an ol' dog that knows what he's hunting for. 'Cause you know, common sense will tell you, you go out there and hunt three or four hours a night and your dog runs a deer 30 minutes, and a fox 40 minutes — well, your night's just about gone, see?

Some dogs are what we call a "slick tree" dog. What we call a slick tree dog will tree, but there ain't no coon up there. Me and another man, both of us were coon hunters. One time we went off to try this dog a man had. And he thought we were dummies, he thought we were not coon hunters. We didn't let him know that we knew anything about a dog. This dog of his, it was a slick tree dog. He'd run awhile and then he'd set down and get him a tree.

So this dog come through there and he had caught him a tree, you know, and was really putting it on. And we came in and looked up there and there ain't no coon up there. I said, "What happened?" He said, "You know what, this dog is so fast he beat that coon to the tree." That's what he told me.

A coon'll try a lot of tricks to slick a dog. I'll tell you what I heard. Some of these old hunters tell you, they say "Listen, I'll tell you what the coon's doin now, he's tapped that tree." I say, "What do you mean, tapped the tree?" They say, "He jumped up the side of the tree like that and jumped off, hoping that dog will go there where his scent is on that tree and fool him." Sometimes he runs way up there and jumps off, and sometimes he goes up there and hits a limb and goes way out yonder and jumps off. And they do it. I've seen 'em do it.

I've seen 'em drown a dog, I mean kill him graveyard dead. Ol' Charlie Godbolt down in Warsaw had a blue tick dog, paid $1,800 for him from another man from Oklahoma. And the dog run out in the middle of a fish pond at night to get a coon, and the coon set right up on the top of his head. Never turned him loose until he drowned him. You couldn't get out there unless you swam. Of course, if it'd been my dog I'd gone out there.

I've been in the Roanoke River to haul out a dog. I carried a patrolman with me one time, Rupert Narrow. And my little ol' dog treed up a little ol' tree. And I shot the coon like a fool, he fell in the river, and the dog dived right on him. And I saw him pulling

***Bunting likes** a coon hound that can be heard a long way. "I like a dog with a good mouth," Bunting says. "It's valuable. When your dog gets in there two or three miles, he needs to have a foghorn on him so you can get to him."*

my dog down. I had hip boots on, had a dog horn on and big heavy hunting coat and I went right in. Balaloom! And I got my hands on my dog and the river pulled us all up under that brush downstream, and I got the coon loose from the dog. I had the dog, but I was under that brush, going on down. And Rupert thought I was drowning. He went back up the hill and told some people, "He's the craziest son of a gun I ever seen. He jumped in that river and he's gone. There ain't no telling where he's at now."

That river was running. But when they come back, I was setting up there on the bank. But hell, I was strong as a bull. That Roanoke River wasn't more to me than a mud hole. I learned to swim on her. I could dive halfway across her.

But that Roanoke will get you. It gets 'em every year and has ever since I was a boy. They come here from all around to fish for herring and rock, and it gets 'em every year. It's got a strong undertow to it. You get down under there, you know, and it carries you every kind of way.

You got to go save your dog, especially if you shelled out a lot of money for him. I wouldn't tell some of the people in this town what I pay for a dog. If I did, they'd get up a committee to try and have me committed.

It ain't nothing for me to fall out of here at 10 o'clock at night, if I read in a magazine about a dog in Kentucky. I leave here about 10 o'clock and I'll have him in my truck by 4 o'clock the next morning coming back home with it. Anyway, there ain't no end to where I go. I been to West Virginia, been to Ohio, Kentucky, Tennessee, Missouri, Alabama, Mississippi, Arkansas, North Dakota, South Dakota, Wisconsin. Been up through all of them.

But let me tell you something. When you're looking for dogs you got to watch out for "I heard," "they said," "we believe" and "I reckon." You got to analyze all that stuff. I believe in genetics. I believe in it more so now than ever. If you got a mother, father, grandfather and grandmother, and if all of them are coon dogs, you got a 100 percent chance of gettin' a coon dog. If there's one dog in there that's not, you got a 75 percent chance. If two dogs, you got a 50 percent chance.

I'd say I owned or traded more than 100 dogs in my life. I bought half interest in my first dog when I was 12 years old. I never knew anything about coon hunting at all, but an old gentleman lived back of me, Wiley Craft was his name, and he started me coon hunting and started me in police work. The agriculture teacher in town had an old blue dog named Spot. Wanted $25 for it. And Wiley had coon hunted some, see, and I hadn't. He didn't have enough money to buy the dog. And he said, "Talk your daddy into loaning you $13. I got $12. And we'll buy 'im." So he did. My daddy let me have $13, and we bought the dog. The first morning, he run him from 2 o'clock 'til day. A lot of them hunt from the first part of the night 'til 12. He hunted from 2 o'clock 'til day. But the first morning we caught enough hide to pay for that dog. We caught three coons and a possum the first morning we took him out.

My daddy tried to discourage me from coon hunting. He said, "Man, that's ol' bad, hard, tough hunting." He was a bird hunter, you know. He said, "I got some nice bird dogs here." I said, "Yeah,but I kinda want to hunt with Mr. Craft some. Me and him are friends."

I liked to hunt with him because your daddy's always supervising, you know, telling you to do this, that and the other. But this old man, he kinda let me run free and let me roll a golden grain cigarette every once in awhile. I had an old single-barrelled gun, a Columbia. I had to push the shell out with a reed. And this old dog — he was about 8 or 9 years old — he'd have to tree a coon about four times before we'd ever get him, you know. Coon was "slicking." The dog would mess up. But by the fourth time he had him. And Wiley'd send me to the tree, and he'd be back there trying to punch out the shell out of the old gun with a reed.

But I've had a dog ever since then.

There's not as many coons as there were when I was a boy. There's more deer now. In fact, I've never seen the deer population increase like they have in this country. When I was a boy, you could hunt any creek you wanted to in this area, and there would not be one deer. You wouldn't have to worry about a young dog running a deer whatever. And now every little creek and every little branch you go into, there's a deer.

And there's plenty of bobcats in here. In fact 20 years ago I didn't see a bobcat track in Halifax County nowhere, and I hunt all the swamps. I don't just hunt 'em in the nighttime, I hunt 'em in the daytime looking for liquor stills. I never saw sign of a bobcat 'til three years after I was here. Then they started picking up. Where did they come from?

There's plenty of bear in Martin County around Williamston and Jamesville. I've treed 'em coon hunting. There's bear all around here.

Turkeys are one thing I never shot in my

life because I never could get one in season, and I've been through the woods at night, and I mean the trees are full of them. They're roosting, you know. I was out hunting with this other fella one time. He says, "I got to have me one of them." I said, "Not when I'm here you ain't going to have one of them. You ain't ruining my character and my reputation."

I ain't got nothing for no poacher or no law violator period. And I tell you where I got that from. When I was a small boy I shot a squirrel one day. My daddy wouldn't let me have a gun. The season wasn't in. So I borrowed one from an old black man. Went down there and shot a squirrel. The dust flew everywhere and it like to kicked my brains out. But I got the squirrel. And I brought the squirrel to the house showing it to my daddy, you know. And he said, "Boy I know exactly where you got that squirrel." I said, "How you know?" He said, "Ain't you been back there back of the field? I seen that ol' squirrel playing in the beech tree down there. C'mon."

He took me down there and said, "Climb up there and kick that nest out." I climbed up the tree and kicked the nest out and there were three little bitty squirrels up there blind. He said, "Now I'm going to have to kill these little squirrels because you so mean and so ungodly and don't listen to nobody that you done killed their mother. That's the reason the laws were put together, so these little things will get time to get their eyes open. You ain't going by the laws."

I stood there and cried my eyes out, you know what I mean. He said, "I ain't going to whup you. I'm going to show you." And I ain't never shot nothing out of season from that day to this, and I don't ever intend to."

I believe what David put in the first psalm. "Blessed is the man that walketh not into the council of the ungodly, nor standeth in the way of the sinner, nor sitteth in the seat of the scornful. But his delight is in the law of the Lord and in his law doth he meditate day and night."

Don't get me started. I know the Bible from the forepart of Peter to the hind part of Paul.

I'll tell you something. When I was a small boy, I was playing in the woods coon hunting, by myself, one early fall. And things were real quiet, real quiet. And I was laying back there, looking at the stars. A whole lot of them were up there. It was just before Christmas. I said, "Lord, what in the world am I doing back here in the swamp by myself? Why in the world would someone want to be back here like this?" And He said, "I have mysterious ways my wonders to perform." You know, in my mind, that's what come into me. And I said, "Well, well."

*"**There's nothing** more soothing to a man's soul than to go out there at night, smell that fresh air and hear a hound baying," says Bunting. "There's a relaxation to it that no psychiatrist can give you."*

But when I got over in the woods in Germany, and the rest of the GIs are losin' their way, I was calm, cool and collected. There weren't no one could outdo me in there, see what I mean. So He taught me. I listened.

My personal opinion is I don't know anything more soothing to a man's soul, than to go out and set on a little ol' creek or a pond, fish a little bit, or go out there at night, smell that fresh air, hear that hound baying. There's a relaxation to it that no psychiatrist can give you, mister. He can't give it to you. And I think it's the greatest blessing on the face of this earth. ⊠

"Carolina Profile" is a periodic feature in Wildlife in North Carolina. *In these interviews, men and women reflect on their outdoor experiences and on what the land and its resources mean to them.*

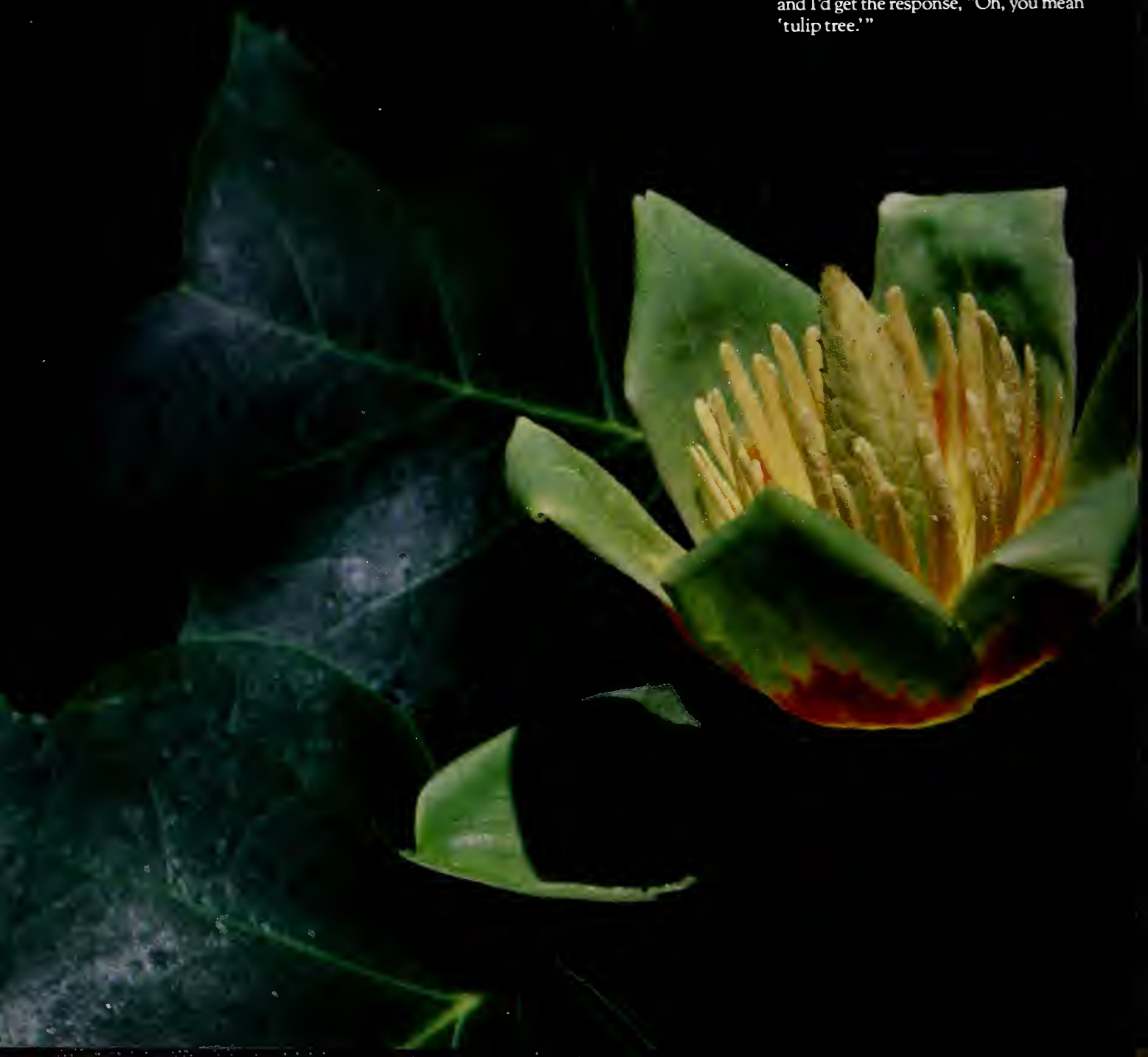
A Tree So Great

Soaring to 200 feet, the magnificent tulip poplar is North Carolina's largest tree. Settlers used its timber for cabins, its bark for siding, and collected honey from its handsome blossoms.

written and photographed by Doug Elliott©

When I tell northerners that I built my house almost entirely of poplar, including the framing, rafters, interior paneling and exterior siding, they seem confused. When I go on to say that there are a lot of old log cabins in the Carolina mountains built from large poplar logs, they look at me like I'm crazy.

I soon found out that to a northerner the word "poplar" refers to aspens and other related trees whose wood is light, soft and virtually useless for house construction. With much further discussion, we would finally get our terminology straightened out and I'd get the response, "Oh, you mean 'tulip tree.'"



Yes, this magnificent tree has many names and even more uses. It is not a true poplar, but was so named because its leaves are attached to its branches by long petioles or leafstems that allow the leaves to move in the breeze in a manner not unlike that of a quaking aspen.

The tulip poplar is actually in the magnolia family. Its scientific name, *Liriodendron tulipifera*, translates as something like "tulip bearing lily tree." This is a great name for the tree because its flowers look like a combination of a tulip and a lily. They are a light greenish yellow and each of the six petals has a blaze of orange at its base.

A large tulip poplar lit with hundreds of large cup-like blooms in spring is a magnificent sight, indeed. The flowering of these trees is very important to beekeepers because it is one of the most dependable sources of nectar in the Southeast. The yield of nectar per bloom is possibly the highest of any plant on the continent and has been calculated at an average of 1.64 grams per flower (that's about one third of a teaspoon). During a favorable season, the nectar flows so abundantly that honey bees and other insects cannot carry it away as fast as it appears. Sometimes you can stand under a blooming tulip tree in a light breeze and feel the nectar dripping like a gently sticky rain. (People who park their shiny new cars under tulip trees often complain about this).

Because the bloom comes early in the season, many honeybee colonies are not strong enough to fully utilize the abundance. For strong hives, however, harvests of 100 pounds of honey per hive have been recorded during just the three-week poplar bloom. The honey is dark in color and is sometimes called "black poplar honey." When held up to the light, however, it actually appears deep amber-red in color. Though it is not as light as locust honey or as sought after as sourwood honey, it has a rich full-bodied flavor that can be used to sweeten fruit salads, yogurt, tea and other beverages. It goes great on pancakes, waffles, cereal, biscuits, cornbread, and other baked goods. Rarely a day goes by that I don't eat some.

If you want the ultimate tulip poplar-nectar-tasting experience, you can even sip it straight from the flower like the bees do. To do this, you need to find a freshly opened blossom within reach. Pick or lower the blossom carefully without jostling it, then lick the droplets on the inside of the petals. Sometimes the nectar collects in a puddle on one of the lower sepals. If the air has been warm and dry, the nectar will often be thick like syrup. After one taste, you will know you have imbibed the nectar of the gods!

Tulip poplar is the king of the magnolia family, considered to be the tallest hardwood tree in North America. In the old forests of the southern Appalachians it has been known to attain a height of 200 feet with a straight trunk 10 feet in diameter and clear

***The "tulip"** of the tulip poplar tree is a large, bright-colored bloom that secretes an abundant nectar. Emitted in droplets in the orange area of the petal, the nectar attracts honey bees and other insect pollinators.*

of branches for 80 or 100 feet. The largest tulip poplar on record is the "Reems Creek Poplar" in Buncombe County. It was 198 feet tall with a trunk 10-feet, 11-inches in diameter 4 feet above the ground. When it was burned in April 1935, it was believed to be the largest tulip poplar in the world, possibly over a thousand years old.

"But despite the splendor of its dimensions, there is nothing overwhelming about the Tuliptree, but rather something joyous in its springing straightness, in the candle-like blaze of its sunlit flowers, in the fresh green of its leaves, which being more or less pendulous on long slender stalks, are forever turning and rustling in the slightest breeze; this gives the tree an air of liveliness lightening its grandeur. So even a very ancient tulip tree has no look of eld (antiquity) about it, for not only does it make a swift growth in youth, but in maturity it maintains itself marvelously free of decay.

This look of vitality comes partly from the vivid palette from which the Tuliptree is colored. The flowers which give it this name are yellow or orange at base, a light greenish shade above. Almost as brilliant are the leaves when they first appear, a glossy, sunshiny pale green; they deepen in tint in summer, and in autumn turn a rich, rejoicing gold. Even in winter the tree is still not unadorned, for the . . . cone remains, candelabrum fashion, erect on the bare twig . . . (until) all the seeds have fallen."

—Donald Culross Peattie

Each cone can produce 100 or more seeds, each seed located at the end of a blade-shaped wing, called a samara, which keeps it airborne. On windy days these seeds whirl like tiny helicopters and are dispersed over great distances. Because they are released gradually all through the winter, the seeds are as important to wildlife as the nectar is to bees. They are eaten by many kinds of birds as well as by squirrels, chipmunks and other small rodents.

On a bright snowy day, two friends cross-country skiing in Pisgah National Forest were surprised to see a white-footed mouse scampering all over the snow, so busy collecting and devouring freshly shed tulip poplar seeds that it seemed completely unaware of their presence.

***This Yancey** County cabin (above) was sided with poplar bark 60 years ago. After removal from the tree, the bark is dried and then nailed to the building like shingles. Bark baskets laced with strips of hickory bark (left) are another traditional use of the valuable poplar tree. These baskets were made by the author.*

***Both wood** and bark of the tulip poplar tree are useful products for house building. Traditional mountain home builders use the bark for siding. To make poplar bark siding, mountaineers score the log with a chain saw and then carefully peel away sheets of the bark with a special tool.*

Indians had many uses for tulip poplar. Using fire and stone tools, they carved dugout canoes out of large straight sections of the trunks and taught pioneer settlers the art. One of the first accounts of this was in 1590 in Thomas Harriot's, *Briefe and true report of the new found land of Virginia.* ". . .the inhabitants that were neere to us doe commonly make their boats or Canoes of the form of trowes, (troughs) only with the helpe of fire, hachets of stones and shels; we have known some being so great . . . that they have carried well 20 men at once besides much baggage: the timber being great, tal, streight, soft, light, & yet tough . . ." Captain John Smith in 1612 reported canoes large enough to hold 40 men.

Daniel Boone made such a canoe 60 feet long, capable of carrying five tons. Into it he loaded his family and all their possessions and in 1799 they floated from Kentucky down the Ohio River and on into what was then Spanish territory. The tree is still known as "canoewood" in some areas.

The bark can be removed from the tree in spring and early summer and has been used in many ways. Large sheets of it were used by Indians as coverings for wigwams, wickiups, and lodges and other living quarters. In the North Carolina mountains, poplar bark has been used as siding on frame houses.

When I first discovered it on some homes near Burnsville in Yancey County, I was struck by its rustic, yet elegant beauty. Because I was building my own house at the time, I wanted to find out how it was done and how long it would last. When I asked around, however, it seemed that most of the builders of these houses had long ago passed on, yet they had left a legacy of poplar bark siding that was still holding up well on those houses after 70 or more years.

I finally found one older man who was a poplar bark craftsman, and he described the process to me. In early summer when the "sap's running," large sheets of the bark are

***Tulip poplar** honey appears very dark when stored in a thick round jar, but when it is bottled in a flatter honey jar its reddish amber color shows through. Beekeepers depend on the flowering of poplar trees because it is a dependable source of nectar. The yield of nectar per bloom is possibly the highest of any plant in North America.*

removed from medium-sized trees. The bark is carefully pried off the trunk with a tool known as a "tan bark spud." This tool harkens back to the days when the collecting of oak, chestnut and hemlock bark was a part of every timber-cutting operation. The bark was sold to tanneries as a source of tannic acid. A spud could be improvised out of a stout curved stick with a chisel-like edge carved on one end. Those made by blacksmiths look somewhat like a small spade.

After it is removed, the bark is then cut into large rectangular sheets, taken to a barn or other dry place and "stacked and stickered" like green lumber with narrow strips of wood between each sheet of bark to allow air to circulate. Rocks or other weights piled on top of the stack of bark ensure that the sheets stay flat and do not curl up as they dry. After a month or two of drying, they can be cut to length and nailed like shingles onto the building.

Armed with these minimal instructions, and a life-long love of tulip poplar, I knew I had to attempt collecting bark to cover at least a part of my house. A friend who was building his own house was about to cut some poplars on his land to use as support beams. He told me that if I'd help him cut them and haul them down to the building site, he'd help me get the bark. The first tree we felled was about a foot in diameter and it fell up hill. We trimmed off the upper branches until we had a length of clear trunk about 30 feet long. With the chainsaw, we made one long cut through the bark down the entire length of the log. Then starting from the bottom, with one of us on each side of the log, we went at it with the bark spuds, our fingers, hatchet blades and whatever else we could improvise to gently pry the bark from the log. The newly forming cambium layer between the bark and the sapwood was soft, slippery and very juicy. As the bark gave way to our efforts and separated from the trunk, it made a slurpy hissing noise.

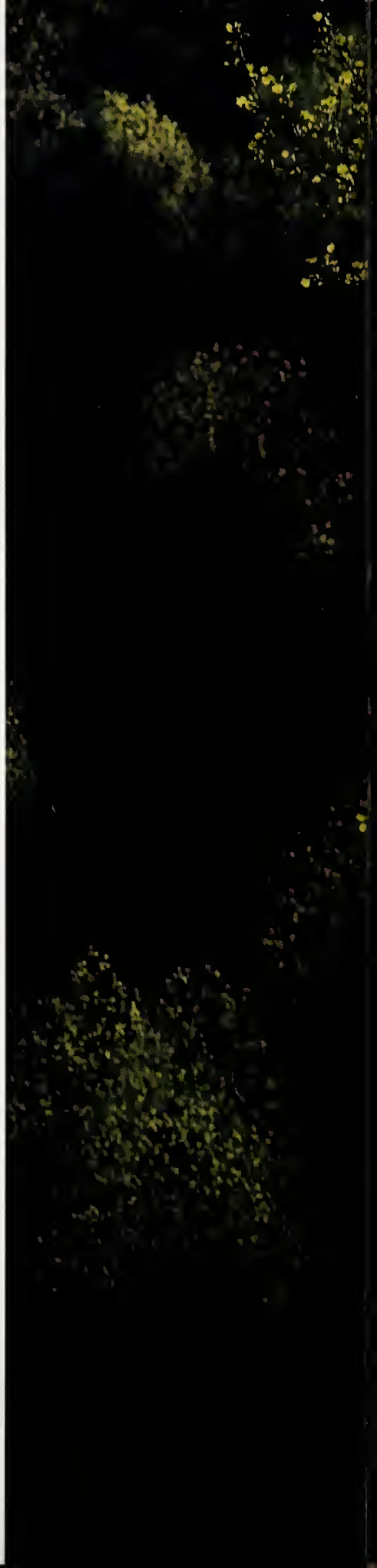
We gradually worked our way up the log and the bark was coming off beautifully. When we finally reached the upper end of the log, the remaining section of bark separated with a resounding hollow "pop". We stood up and congratulated each other on a job well done. As we did, we heard a noise and looked down just in time to see that newly skinned log sliding down the hill! Its freshly removed bark created a trough that was slicker than any bobsled run and by the time that log left that piece of bark it had picked up a terrific amount of speed and momentum. It went careening down the mountainside and all we could do was watch in astonishment as it leapt over rock ledges and crashed through thickets. It finally stopped about 50 yards down the hill when it crashed into a stump right above the house foundation. We breathed a sigh of relief.

If the log had not been stopped by the stump, that slippery battering ram could have damaged the foundation and might have ended up well below the house site, down in the creek! After that, we secured a rope to each log before we removed its bark. I found out later that mountain loggers have a word for this phenomenon. It's called "ball-hooting" and is recognized as a serious danger when logging steep mountain slopes during spring and summer.

As one old logger told me, "Them poplar logs is bad for that. When the sap's up, that bark can slip off a log you're dragging and if that log gets loose and goes a ball-hooting' down that mountain, Buddy, 'hit can kill a man!"

The bark of small tulip poplar trees can be scored and folded into carrying vessels of all sizes from berry baskets to backpacks. Indians daubed the seams with pine pitch and used them as water buckets. I was first introduced to bark basketry by my mountain neighbor and friend Paul Geouge, who has been making baskets for years. I was enchanted by the way he explained their simple practicality.

"So you've been out fishing all morning, following the creek up into the mountains," he said. "You're catching some of them native speckled trout, but after a while the stream gets too small. So you can call it quits and head up onto the ridge for the long walk home. There you run onto the biggest patch of ripe huckleberries you have ever



seen! You'd love to take some of them berries home, but you ain't got nothing to carry 'em in.

"What could you do?" Paul asks with a twinkle in his eye. "Well if you knew how to make a berry basket, you'd just find you a young poplar tree, make you a poplar bark basket and tote them berries home. Now they'd taste mighty good after a fish dinner!"

Tulip poplar bark also has other uses. Between the outer layer of the bark and the sapwood is a layer rich in fibrous vascular material known as bast. When rotted under controlled conditions it can be used to make ropes, twine and other cordage. It was highly valued by Native Americans for these uses. The bark has also been used medicinally as a tonic and a remedy for fevers, stomach ailments, dysentery, rheumatism and gout. It is a source of tulipiferine, an alkaloid that acts as a heart stimulant.

In European gardens tulip poplar is one of the favorite "exotic" American ornamental shade trees and it has been so for more than 300 years. In fact, the tulip poplar was first described botanically in 1687 from a specimen that had been brought from the New World and was growing in an English garden.

In the early part of the 18th century, John Lawson, Surveyor-General of North Carolina, reported a hollow tulip poplar "wherein a lusty Man had his Bed and Household Furniture, and lived in it till his labor got him a more fashionable Mansion." Of course the settler's "more fashionable mansion" would probably have been no more than a log cabin made of tulip poplar logs. There are many old tulip poplar log cabins still standing today and new ones are still being built.

The first significant cutting of poplars in the new world was by settlers who were clearing ground for farming. They knew that where the tulip poplars grew, the soil was the richest. Today this still tends to be true. Ginseng hunters look for stands of tulip poplars when scanning distant mountainsides in search of the moist rich soil that characterizes good ginseng habitat.

It wasn't until two decades after the Civil War in the late 1800s, when the railroads began to penetrate the rugged mountainous areas of the Southern Appalachians, that the huge poplars and other southern hardwoods were harvested. In those days only trees over 30 inches in diameter, yielding 400 board feet, were accepted at the mills. In some areas tulip poplar grows in almost pure stands. In 1912, a tract of land near Looking Glass Rock in Transylvania County yielded 40,000 board feet of tulip poplar lumber per acre. Nowadays loggers are pleased to get 10,000 board feet per acre.

Foresters call tulip poplar a hardwood because it is a broad-leafed tree, like oaks and maples. Pine, fir and other conifers are called softwoods. The wood of tulip poplar, however, is as soft and easily workable as white pine. Because the extensive heartwood is a yellowish-tan in color, it is known as "yellow poplar" in the lumber business. The sapwood is creamy white and had been used as interior paneling. When used in this capacity, it has been called "whitewood." Because of its lightness and strength, it is used for boxes and crates. Yokes for oxen were often made from tulip poplar because it can be so easily carved. It was also one of the favorite woods for aircraft in the days when wood was used in airplanes. The wood when compressed has the ability to return to its normal shape when the pressure is released. This property accounts for its having long been a favorite material for barrel bungs. Its porosity and ability to take glue make it an ideal core upon which to glue veneers of other wood. And because it takes a polish better than any other native wood, it is often used as a veneer itself.

Yellow poplar makes a good framing lumber for house construction. It is moderately lightweight yet stronger than spruce, fir and white pine, and has little tendency to split when nailed. In recent years, it has been little used because of the abundance of low-cost softwood timber such as Douglas fir and spruce shipped in from western states. The North Carolina Building Code accepts its use as a framing lumber when graded and as the supply of these western softwoods decreases, tulip poplar may come back into more common use. Pulp mills manufacture a high grade of paper from tulip poplar.

Since the beginning of time, people who have lived in the southeastern part of our continent have been blessed with an abundance of tulip poplar. It has been used for boats, baskets and buildings, and as a source of valuable cordage, essential shelter, gourmet honey and healing medicine. In fact, even these words you are now reading may have been printed on paper made from tulip poplar.

***Tulip poplar** trees are among the first to green up in the spring. The areas where poplars grow indicate moisture and richer soils often near streams.*

Doug Elliott's most recent book, titled Woodslore and Wildwood Wisdom, *can be ordered from him at Possum Productions, Rt. 1, Box 388 Union Mills, N.C. 28167 for $10. post paid.*

Biologists Suspect Disease May Be Cause

Rabbit Population Drops At Penny Bend Study Site

Written and Edited by Angela Dorman Hill

North Carolina wildlife biologists continue to search for the reasons wild rabbit populations have been declining in the state and other parts of the Southeast for at least two decades.

Rabbit hunting in North Carolina has been a tradition since the 1920s when Caswell County alone shipped more than 45,000 a year by rail to New York and other large cities. Today, rabbit hunters are satisfied just to have enough rabbits to enjoy a chase with a good pack of beagles.

Recently, a N.C. Wildlife Resources Commission research project yielded some interesting leads on the problem.

Biologists with the Wildlife Commission are investigating the role of disease and predation in controlling rabbit population levels. Standardized fall box trapping has been conducted on the Penny Bend Rabbit Research Area near Durham each November since 1982. Capture success during a seven-day period using 100 box traps has been used to monitor population changes on the area.

This year, after six years of habitat improvements and stable rabbit populations, the rabbit population dropped to almost nothing.

"The declines we have seen are very localized and are not being seen on other areas we are studying," said Carl Betsill, small game program coordinator for the Wildlife Commission. "This decline on an intensively monitored area like Penny Bend Rabbit Research Area gives us a unique opportunity to study the reasons for the population decrease. Since food and cover conditions have steadily improved during the study and we have noted no dramatic increase in predator levels, we theorize that the recent population drop may have been caused by disease. With assistance from the Southeastern Cooperative Wildlife Disease Study in Athens, Ga., we are planning to screen populations of mammals on Penny Bend and the game land area for disease organisms that have the potential to drastically lower rabbit populations."

Already many of the remaining rabbits have been collared with radio transmitters and are being monitored daily to determine survival rates as well as the probable cause of death.

"Theories abound about the cause of rabbit declines," Betsill said. "These range from decreases in available habitat to genetic changes in the rabbits themselves. Recent studies have indicated that a fungus living in common fescue may even be the culprit.

"This theory advocated by some rabbit hunters for a number of years has only recently received serious attention from research scientists," Betsill said. "Other work by the Commission at Penny Bend is focusing on predator-prey relationships, another theory of rabbit declines favored by hunters."

N.C. WILDLIFE RESOURCES COMMISSION

Happy hunter: *A North Carolina rabbit hunter is happy with his success. But fewer small game hunters are finding rabbits, as their populations continue to decline across the state as well as the Southeast. Wildlife biologists at the Penny Bend Research Area in Durham County are searching for answers to the problem.*

Rabbit Tasty Fried Or Barbecued

Rabbit provides good hearty eating almost anytime. These rabbit recipes were provided by Melvin Jones, an avid rabbit hunter who works in Administrative Services in the Wildlife Commission's Raleigh offices. Melvin obtained them from his aunt, Mrs. Flonia Brooks, and he'll be the first to testify that they're mighty fine eating.

Fried Rabbit

Soak cut up or whole young rabbit overnight in salted water. Remove from water, pat dry and place quarters or smaller pieces in a bowl with one egg. Mix with egg and then add flour until batter covers pieces.

Fry in shortening or oil in a covered pan on medium heat. Remove cover last 15 minutes and finish cooking.

Barbecued Rabbit

2 rabbits
1 cup vinegar
1 cup water
½ cup butter or margarine
salt and pepper to taste

Soak rabbits overnight in salted water. Place rabbit pieces in roaster or covered pan, add all ingredients and cook in 350 degree oven for 1-½ to 2 hours (larger rabbits take longer). Add Texas Pete or favorite barbecue sauce if you prefer.

Survey Identifies Park Users

State Parks Visitors Spend $26 Per 12-Hour Visit

Visitors to North Carolina state parks and recreation areas spend, on the average, more than $26 per person during a 12-hour visit, according to a survey conducted by the N.C. Division of Parks and Recreation.

The Public Area Recreation Visitors Survey was designed to determine economic opportunities on public lands. The survey, conducted under contract with the Southeastern

Forest Experiment Station of the U.S. Forest Service, provided detailed information about recreational patterns across state parks.

Here's what the survey found: The typical visitor to North Carolina parks is a 38-year-old male who attended, but did not graduate from college. He is employed full-time; has a family income of between $30,000 and $34,999; and drove 75 miles one way with his family, which includes 1.5 children, to visit the park.

The typical visitor is familiar with the state park because he visits it about 10 times a year. He spends $2.23 for each hour of his visit and spends more than $915 each year on recreation. He visits the same park because it's convenient and the other areas available to him are too crowded.

The Park Service hopes to reverse this situation by using artificial barriers to protect the remaining brook trout, and the effectiveness of these barriers is being studied. Rainbow and brown trout won't be removed from the park, but regulations allow them to be caught and kept by anglers. If the artificial barriers work they may be installed on other streams, and brook trout would be restocked in these waters. Since brookies may not be kept by fishermen, they should be able to reestablish their population.

The Great Smoky Mountains Natural History Association has issued a special print to help raise funds for the brook trout restoration project. This print shows a brookie rising to a mayfly, and was done by wildlife artist Lee Roberson of Townsend, Tennessee. Prints are available at at visitor centers or from the Great Smoky Mountains Natural History Association, Gatlinburg, Tennessee 37738.

On a scale of one to 10 where rankng a 10 indicates a completely enjoyable experience, the park visitor rates his recreation experience slightly better than an eight.

"While at the park, he is likely to walk, swim, camp at a developed site, sightsee or picnic," the survey reported. "His favorite recreation activities are walking, dining, swimming in a pool, bicycle riding and running or jogging."

A broad range of citizens could use the information compiled by the survey, says Dr. William W. Davis, director of the N.C. Division of Parks and Recreation.

"Accurate knowledge of the amount of income, employment and industry growth that public recreation areas contribute to the economy is important to agency administrators, legislators and the private recreation industry," Davis said.

The PARVS project represents the first attempt to study the economic impact of state park visitor expenditures on the North Carolina economy.

Interviewing for the survey took place in the summer and fall of 1986 and spring 1987. The parks in the study were Hanging Rock, Stone Mountain, Kerr Lake, Fort Macon, Weymouth Woods, Goose Creek, Cliffs of the Neuse and Carolina Beach.

It's A Truck; No, It's A Boat . . .

Wildlife officers last fall reported little boating activity, but one case gave new meaning to the term "motorboat."

The officer encountered an individual driving his four-wheel-drive vehicle into Lake Waccamaw in Columbus County while intoxicated. The vehicle began floating and the officer charged him with operating a motor vessel while impaired. The judge ruled that the truck was a motorized conveyance and a vessel at the same time, and fined him $125 and court costs.

Calendar Of Events

On several occasions, events in this calendar have been changed or canceled without notice. Readers should check with the contact listed before traveling to an event.

April 8-9
Carolina Coastal Celebration at the Kerr Scott Building at the state fairgrounds in Raleigh. The free event will showcase traditional entertainers, crafts, "strange seafood," and educational exhibits about the coastal environment.

April 12-16
The 19th annual Grifton Shad Festival At Grifton, N.C., on Contentnea Creek. Most events will be on weekend of 15th and 16th and will include an art show, a storytelling contest, a craft show, clogging and a band concert and an historical museum. For more information call 919-524-4075.

April 14-16
Second Annual Oak Hollow "Boat Float" at Oak Hollow Lake in High Point, an on-the-water "boat show." For more information contact Oak Hollow "Boat Float." 221 Nathan Hunt Drive, High Point, N.C. 27260.

April 29
N.C. Herpetological Society spring meeting at the Natural Science Center in Greensboro. For more information, contact N.C. Herp Society, NCSM, P.O. Box 27647, Raleigh, N.C. 27611 and (919) 733-7450.

May 5-7
Outdoor Bowhunter Shoot sponsored by the Mecklenburg Bowhunters at the Mecklenburg Wildlife Club in Charlotte. Competitors will shoot at three-dimensional targets at unmarked distances. For more information contact Jessie Smith, Mecklenburg Bowhunters, 7630 Holly Grove Court, Charlotte, N.C. 28227.

Waterbird Protection Planned

Nongame, Endangered Donations Hit Record High

North Carolina citizens hit another record high last year with their contributions to the state's Nongame and Endangered Wildlife Fund.

Figures provided to the N.C. Wildlife Resources Commission by the state Department of Revenue show contributions have reached nearly $1.75 million through the state income tax checkoff program over a five-year period. Tax returns through September 1988 show a record $425,426 was contributed to the Nongame Program. By the same period in 1987, contributions totaled $384,758.

Records also show that more and more taxpayers are checking the block for the Nongame Fund. The number of contributors has increased from 36,216 in 1986 to 45,318 in 1988.

Each year, North Carolina residents may check a line on their state income tax form and designate any or all of their refund to the Nongame and Endangered Wildlife Fund. The Fund is used by the Wildlife Resources Commission to manage and protect nongame wildlife and species that are endangered, threatened or of special concern.

Since the checkoff program was enacted by the N.C. General Assembly in 1983, the contributions have been used only for projects involving nongame and endangered wildlife. Public support is vital to the success of conservation programs for such species as the bald eagle, peregrine falcon, Virginia big-eared bat, northern flying squirrel, sea turtles and the Tar River spiny mussel.

A panel of 17 volunteer citizen conservationists forming the Nongame Wildlife Advisory Committee guides the Commission's nongame program including the expenditures of nongame contributions.

The increase in contributions will allow the program to begin a plan to protect nesting sites used by North Carolina's colonial waterbirds such as pelicans, sea gulls and terns.

"All these birds nest on natural barrier islands, beaches, or spoil islands in coastal waters," said Randy Wilson, manager of the Wildlife Commission's Nongame Program. "We will identify areas that are important to birds and make sure a variety of habitat types are present. If all the birds were confined to one island, overwash from a storm could wipe out their entire colony."

Spoil, which is sand and mud produced when a waterway is dredged, can be used to replenish islands and restore habitats.

The Nongame Program has also used the donations in the past year to reintroduce the rare spotfin chub in waters of the Great Smoky Mountains National Park.

The contributions also funded a small-grants program which awarded 19 grants totalling $50,000 to individuals and organizations for research, management and education projects on nongame and endangered species in North Carolina in 1988.

"We wish we could thank every contributor personally, but tax records are strictly confidential," Wilson said. "Records show that we have a strong group of supporters that has grown annually. The increasing number of contributors and amount of their donations indicate that the people of North Carolina support this program and the work being done by the Commission."

MELISSA McGAW

Endangered species: *This immature bald eagle was rehabilitated and released after it was discovered floating in Jordan Lake more than a year ago. Veterinarians said it probably became sick after it ate a rodent or smaller bird that had been poisoned by pesticides. Nongame and Endangered Fund monies help in the recovery and management of such wildlife.*

Everyone's talking about

Wildlife in North Carolina . . .

the book!

"This book . . . is a fitting commemoration of the magazine's 50th anniversary. The book's four sections reflect the emphases seen each month, as the magazine seeks to interest nature lovers and environmentalists as well as the serious hunters and fishermen . . ." —Linda Brinson, Winston-Salem *Journal*

"It is not only for the sportsman in the family but for all the family and an excellent book to send both to Tar Heels who have moved away and to folks who have just moved into North Carolina . . . The only fault I find with *Wildlife in North Carolina* is that it is not long enough."
—Bugs Barringer, Raleigh *News and Observer*

Published by the N.C. Wildlife Resources Commission and the University of North Carolina Press. Hardbound copy is $24.95 at your local bookstores. **Or order direct using the special order form below.**

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Please ship my copy(ies) of *Wildlife in North Carolina*—"the book"— to:

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Send prepaid order to: University of North Carolina Press, P.O. Box 2288, Chapel Hill, NC 27514.

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Shipping Charges: $1.50 for first book, 75¢ each additional book $_____

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☐Check/money order payable to **UNC Press**

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Signature _____

Reader Likes Setup

Roanoke Hunt Draws Praise

Dear Wildlife:

I just completed a two-day deer hunt on the Roanoke Wetlands and thought I would give you some thoughts about the hunt.

Three of us spent two days hunting amid some of the largest, most impressive oaks, elms, sycamore, and gums I have ever seen. We saw deer, coons, woodcock and squirrels. The camping on the river's edge was quiet and peaceful. There were no screaming kids, dogs or inconsiderate, drunk hunters partying all night. The three N.C. Wildlife Resources Commission biologists and technicians I met were considerate and helpful. In short, the last two days were the best —bar none—I have spent on any North Carolina game lands in over 15 years of hunting from Pisgah to Goose Creek.

You provided a high quality hunting experience for those lucky enough to be drawn and I congratulate you. The items that contributed most to this quality were the low number of hunters, the opportunity to camp within 100 yards of the river, the beauty of the mature forest and last—but not least —the quality of the hunting. I sincerely hope the hunts continue in the same vein.

I have a few suggestions:

— Continue to have limited permits for either-sex deer hunts. But allow more than three choices. There were about 30 possible combinations of date and location.

— Continue to have boat-only access to the areas and allow riverbank camping. If litter becomes a problem (and I do not think it will) then record boat numbers.

— If bow-hunting pressure was low for these areas with the drawing, consider having bow season coincide with the state season and require no drawings or permits and see what kind of pressure next year brings.

— If you start to have overpopulation problems, allow those hunters drawn to take two deer in a two-day hunt.

— List local laws for Bertie County such as the special Roanoke River Laws.

All in all, gentlemen, you have provided North Carolina sportsmen with a high quality hunting experience. Thank you.

Robert Abernethy

Editor's Note: The N.C. Wildlife Resources Commission opened the Roanoke River Wetlands in northeastern North Carolina last fall to special permit hunting and trapping. Suggestions for changes are appreciated and the Commission will consider each one as it prepares regulations proposals for coming years.

The Wings of Dawn

The Wings of Dawn by George Reiger, $15.95, paperback, 320 pages. Published by Nick Lyons Books, 31 West 21 Street, New York, N.Y. 10010 (212-620-9580).

It's been eight years since George Reiger wrote *The Wings Of Dawn*, but it still lives up to its subtitle, "The Complete Book Of North American Waterfowling." And if you're a waterfowl-hunting enthusiast who didn't read it when it first came out, you've got another chance with this paperback reprint by Nick Lyons Books.

The quality that separates Reiger's book from most other books on the same subject—indeed, most books on any sporting subject—is Reiger's skill as a writer. You could know more about his subject that he does—though highly unlikely—and still find his prose appealing. Here is a solid history of every facet of waterfowling from market hunting through the beginnings of controlled hunting and the birth of a hunting ethic. Here also are the more recent problems facing North America waterfowl populations. Along with this historical overview are fascinating chapters on important species, duck stamps, decoy makers and a lot more. Reiger frequently reports in the first person, an intimate and effective way of involving the reader. —*Jim Dean*

Field Notes

Season openings, closings and regulation changes:

- Wild turkey season open from April 8 through May 6.
- Trout season open from April 1 through June 30.
- Crow season opens June 1 to June 30.

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on January 31, 1989

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	46,276	$15,077,778.24
Lifetime Hunting License	443	115,459.01
Lifetime Fishing License	3,518	720,803.88
Lifetime Subscriptions to Wildlife in N.C.	1,534	202,667.18
Contributions	—	142,363.47
Fund Total	51,771	$16,259,071.78
Total Interest Earned	$3,802,438.06	

At Lake Waccamaw

Access Area Dedicated To Officer

The N.C. Wildlife Resources Commission has dedicated the Lake Waccamaw Boating Access Area to the memory of Troy Monroe Sigmon, a veteran wildlife officer killed in the line of duty in 1978.

Commission members and staff gathered in January with family and friends of Sigmon for the ceremony at the access area on Lakeshore Road at Lake Waccamaw.

Sigmon, a 25-year veteran wildlife officer, died when the helicopter in which he was flying struck power lines and crashed in Brunswick County during a surveillance of dove baiting in 1978. He was on surveillance with a U.S. Fish and Wildlife Service agent in a Service helicopter. The federal agent was injured, but was able to leave the helicopter and walk to a nearby house to telephone authorities.

Sigmon was first stationed in Chadbourn as an officer. He was promoted to sergeant and moved to Lake Waccamaw in 1967.

He was the recipient of the first Wildlife Protector of the Year award given annually since 1958 by the N.C. Wildlife Federation. He was a member of the N.C. Law Enforcement Association and was serving as president of the Columbus County Law Enforcement Association at the time of his death.

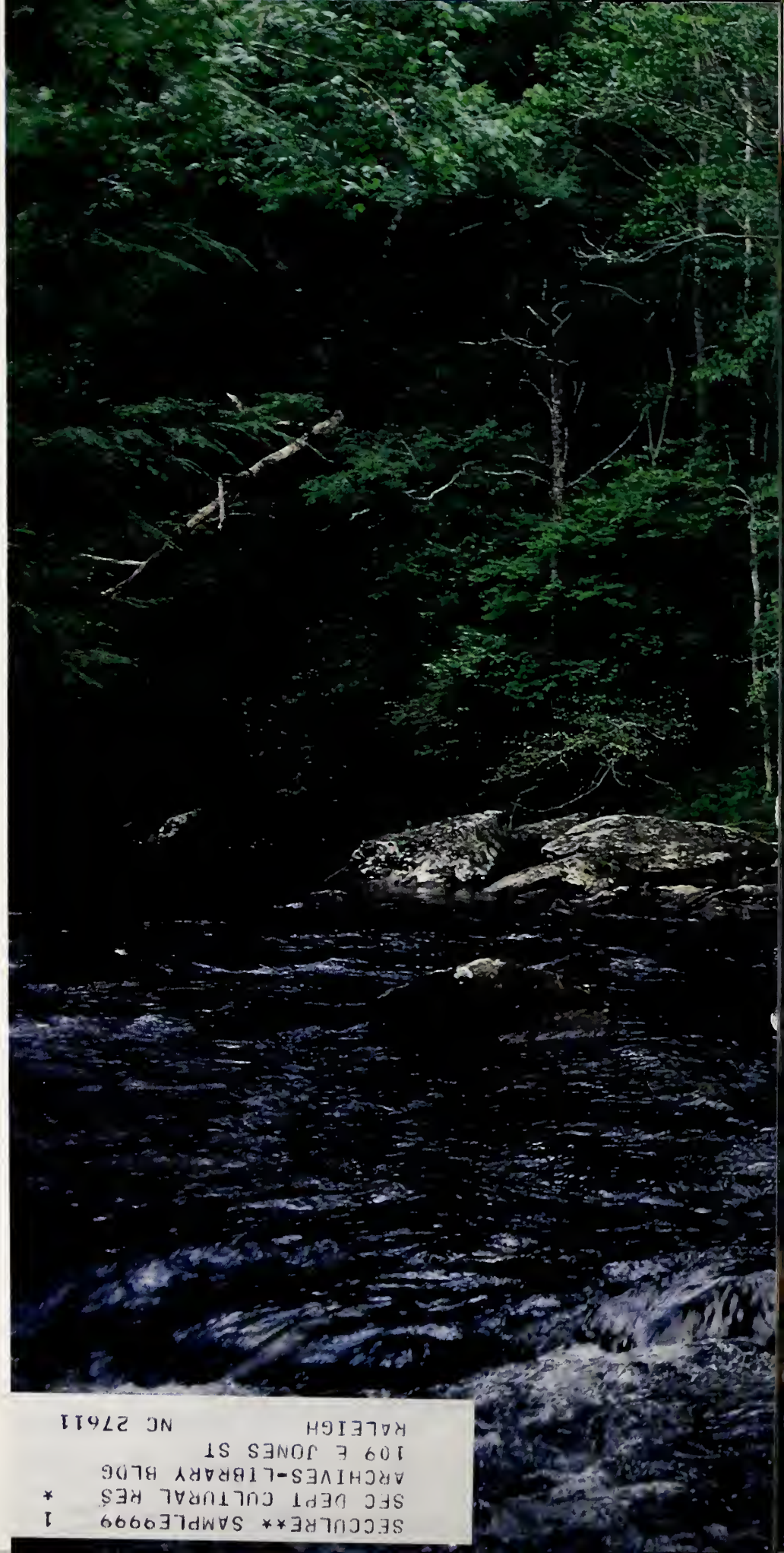
He received the Woodman of the World National Conservation Award, was a former Boy Scout leader, a member of the Lebanon Lodge No. 207, a member of Lake Waccamaw United Methodist Church and past president of the Methodist Men's Club. He was also the youth director on the Boy Scout Board for the Lake Waccamaw Boys' Home.

ANGELA DORMAN HILL

Sigmon remembered: *Nancy Sigmon, wife of the late Wildlife Officer Troy Monroe Sigmon, is joined by other wildlife employees and Commissioner Reed Allen in dedicating the Lake Waccamaw Boating Access Area to Sigmon's memory. From left are: Commissioner Allen, wildlife commissioner whose district includes Lake Waccamaw; Jimmie Davis of the Commission's Division of Boating and Inland Fisheries; Mrs. Sigmon; Col. Harold Ragland, chief of the Commission's Enforcement Division; and Lt. Bobby Tatum, who organized the dedication ceremony.*

SUPPORT THE NONGAME AND ENDANGERED WILDLIFE FUND

The money you give to help restore the peregrine falcon also helps the spiny mussel, green sea turtle, bald eagle and many other nongame species. (Contribution form page 33)



April Appointment

Thousands of anglers cast off the bonds of winter on the traditional opening day of the trout season — this year on April Fool's Day. But it may be a month or more before fishermen encounter a gentle day like this.

LITHOGRAPHY BY EDWARDS & BROUGHTON COMPANY, RALEIGH, NORTH CAROLINA

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WILDLIFE IN NORTH CAROLINA

MAY, 1989 75 CENTS

The World's Biggest Bass Pond

by Jim Dean

I left the house at Waterlily earlier than the others, stepping out of the bacon-and-egg warmth of the kitchen into the brisk May dawn. Light was rapidly brightening in the east, blotting out the stars. In front of me, across Currituck Sound, a thin blue line marked the distant Outer Banks.

For the past week, a strong southerly breeze had been pushing water into the sound, flooding the marshes. High water would help the bass fishing, but a lingering high wind would make boat handling and casting difficult. We'd worried about that, but sometime during the night the wind had dropped. Now Currituck was a mirror, reflecting the puffy predawn clouds and the quivering reflections of boats and net stakes. We could not have asked for better conditions.

JOEL ARRINGTON

I walked down the steps from the bluff to the open door of Cecil Whitson's shed beside the pier and peered inside at rows of weathered canvas goose decoys—reminders of Currituck's other glorious heritage. A few minutes later, Clarence Baum came down to the dock and disappeared into the cabin of the 25-foot boat. Man and boat were in their 8th decade, and I could hear Clarence gently fussing with his old companion, coaxing it to start one more time. We'd use his boat to tow our juniper skiff across the sound to the best fishing spots.

I sat down on the steps with my coffee and tried to soak up every picturesque fragment because it was my first trip to Currituck. The year was 1969, and the sound's present woes seemed as distant as those fading stars.

During the next 10 years or so, I fished Currituck almost yearly, but I never recall a morning like that, or two days of better fishing. Bass were gathered along the edges of the marshes we fished behind Corolla Light, at Monkey Island and near the Currituck Club. A Gerbubble Bug or Marsh Hare dropped beside the grass and twitched a couple of times would almost invariably bring an explosive strike. Later in the day, we fished the grass beds and around duck blinds with Johnson spoons and pork rinds. Just beyond the dunes, we could sometimes hear the hollow booming of the surf on what were then still wild beaches.

Fishing was only part of it. I was fortunate to share the company of a succession of colorful guides who showed us where the bass were, poled the boats, and kept us laughing—men like Blanton Saunders, Bud Lupton, Wilton Outlaw and others. Wilton, then in his late 60s, once told us, "If every mile I'd ever poled had been away from home, I wouldn't live long enough to get back."

Superb fishing was almost routine under favorable conditions on what one writer at the time called "the world's biggest bass pond," and it remained excellent even after the invasion of Eurasion water milfoil that eventually covered much of the sound during the past decade.

I recall watching the late Blanton Saunders patiently tilt the heavy 25-horse outboard on his skiff every 50 yards or so all the way across the sound to clear the weeds when the prop would bog in mats of milfoil.

"I'm amazed you aren't cussing that grass a blue streak," I remarked.

"If the bass and ducks can learn to love it, so can I," was his heavily edited answer.

The milfoil infestation has since diminished naturally as many experts predicted it would, but Currituck is no longer a bass haven. The cause of the present decline in bass fishing has little to do with the milfoil because fishing was good before the milfoil came. Nor is it overfishing. Instead, it's an old and familiar foe of these brackish waters—salt.

In years past, storms that opened inlets or washed over the Outer Banks have periodically raised the salt content in this brackish sound, temporarily driving out or killing freshwater species like bass and white perch. Three years of drought is the culprit this time but, as in the past, good bass fishing will most likely return once the sound's salt content drops below 10 percent. Meanwhile, the poor fishing is a bitter pill for fishermen to swallow, and even worse for the guides and other businesses who literally bank on this area's natural attractions. After all, recreational income is the region's biggest industry.

There is, however, a more ominous threat to Currituck's natural resources and long-term economic strength—one easily seen on those once wild beaches. This area is undergoing an incredible boom in development led by the construction of recreational homes. Pollution from septic tanks and many other sources is growing, bringing the likelihood of permanent damage to Currituck's historic bass fishing, waterfowl hunting and other attractions.

The goose that laid the golden egg is facing the ax, and you can add Currituck to the list of troubled waters alongside Pamlico and Albemarle sounds. Only one thing is certain: salt is the least of it.

May, 1989
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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *Late spring is the season of abundance and somewhat easier living for most wildlife species, and this bobwhite quail is taking advantage of it. Photograph by Lloyd B. Hill.*

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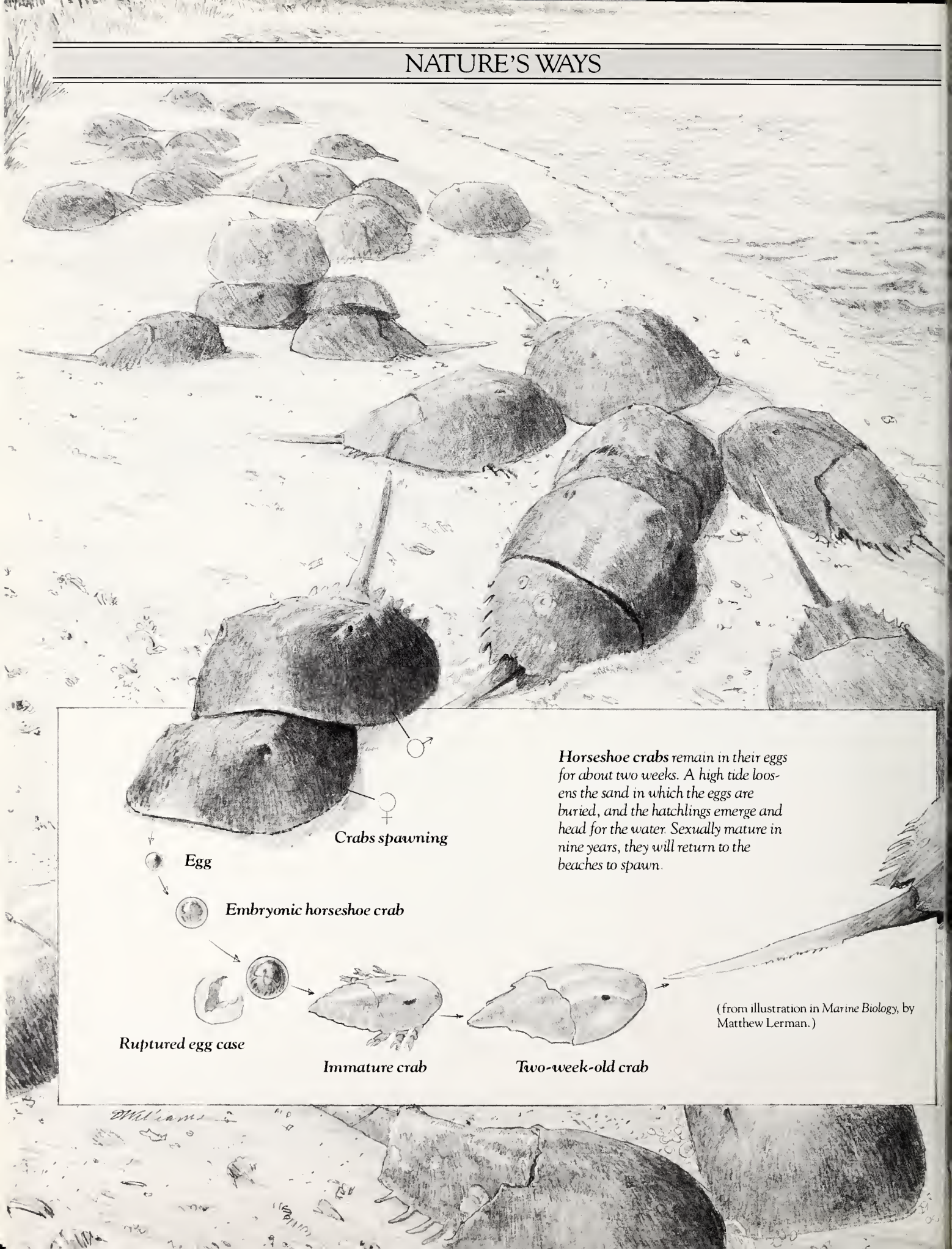


Horseshoe crabs *remain in their eggs for about two weeks. A high tide loosens the sand in which the eggs are buried, and the hatchlings emerge and head for the water. Sexually mature in nine years, they will return to the beaches to spawn.*

(from illustration in *Marine Biology*, by Matthew Lerman.)

The Crab That Isn't

written by Lawrence S. Earley / illustrated by David Williams

In late spring, horseshoe crabs gather on protected shores to mate. Males and females mate either in the shallow water or at the high-tide line where the female digs a hole and lays her eggs. Sometimes the horseshoe crabs are left high and dry by the retreating tide. The crabs dig into the sand until freed by the next high tide.

'Tis the month the horseshoe crabs fall in love. After the full moon on May 20, thousands of these strange, armor-plated sea creatures will emerge from the deep long enough to lay their eggs on the high-tide line and then disappear into the water again. They've been around for over 200 million years, yet these living fossils today are a common species on our coast from Maine to the Yucatan.

Actually, the horseshoe crab is a misnomer because it isn't really a crab at all. Taxonomically, it's more like a spider or a scorpion, although some scientists prefer to put it in its own taxonomic order — *Xyphosura polyphemus*. If you were to look at a horseshoe crab from stem to stern, you'd see that its armored construction really has two hinged parts: a rounded section on top called the thorax, and a triangular abdomen on the bottom with a tail-spike extending from it. Beneath the abdomen are gills arranged in five sections called "books," while underneath the hard forward shell are the animal's legs.

On these legs, the "crab" crawls along the bottom of the shallow bays and inshore waters where it spends most of the year (unless it decides to swim by flipping upside down and flapping its gills). Then in May, triggered by warming water and by the spring tides of a full moon, thousands of them crawl ashore. The males arrive first and gather near the high-tide line. But within an hour of the high tide, the females join them and it's a scramble from there on in as scores of males attempt to attach themselves to a female. Once a male is clasping a female with specialized hook-shaped claws, the female digs a hole and lays several clumps of greenish eggs that may total anywhere from 2,000 to 30,000. The male's sperm fertilizes the eggs.

In about two weeks, the eggs are ready to hatch. Another high tide loosens the sand where they are buried, helping to free the hatchlings and send them on their way to the water. It's a free feed for thousands of birds and other predators as they feast on the quarter-sized crabs. At sea, the growing horseshoe crabs will molt several times during the first two to three years, and then perhaps once more until they reach sexual maturity in nine to 11 years. At this point, their breeding urge will cause them to migrate back to the beaches from which they hatched so many years before.

Though some beachcombers fear the tail spike of the horseshoe crab, both crab and tail are harmless. Twin openings on the front carapace are the eyes.

The empty shells (called carapaces) that litter the beaches at this time of year are grim evidence of the costs of the crabs' mating instinct. Waves easily knock the crabs over when they are inshore, or they turn themselves over with their own frantic struggles to mate. Once on their backs they find it difficult to right themselves, although they employ their tails for this purpose. Children are drawn to the large and hard shell, and concerned adults sometimes warn them against touching the "tail," as if it were a stinger of some kind. But the tail is harmless, as is the creature itself.

The protected side of Rachel Carson Estuarine Reserve is a good place to witness the horseshoe crab migration this spring. You might also see them on the sound sides of Shackleford Banks, Cape Lookout and even Core Banks. Horseshoe crabs may come ashore during the day, but they're more likely to be seen at night. It's a scene that predates even the dinosaurs, a 200-million-year-old ritual of indominatable life.

BASS IN THE GRASS

When bass gang up around grassy areas in shallow water, the fishing can be great if you know the right tactics.

written and photographed by Pete Elkins

There has to be a first for everything. Until that morning several years ago, I had caught bass deep, shallow, at night, in creek channels and on points. I'd caught them on topwater lures, on worms, and lots on spinnerbaits. But never in the grass. That gap in my fishing experience was finally corrected—and in a truly memorable way.

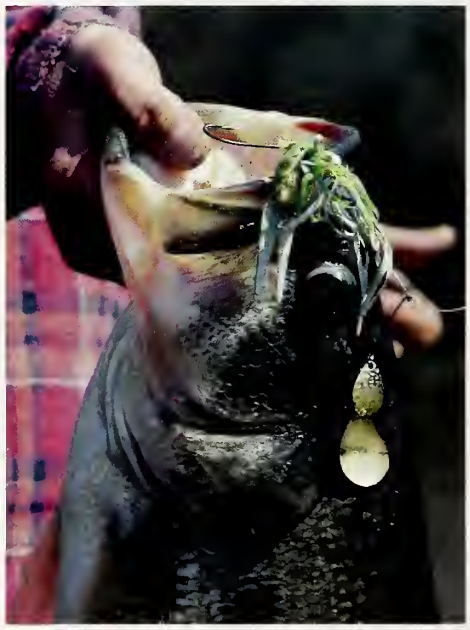
It wasn't much of a creek, really more of an overflow where the lake's upper reaches spilled back into an oxbow that looked awfully bassy. Thick clumps of aquatic grass paralleled the shallow shoreline. In places, only thin stems of the grass reached the surface. In other spots, the green stuff formed a thick mat several feet across.

My spinnerbait landed several feet behind the nearest clump of grass. When it touched the far side of the grass, I quickly skittered it across the green tangle in an attempt to avoid tangling in the grass.

"If you do that, you won't catch anything," my partner observed. Since we were fishing his turf, I listened. "They're right in the grass, so work the bait through it slowly. Don't worry about getting hung."

After a little practice, I learned I could make a slow, controlled retrieve right through even the thickest grass clumps. Then I found out why my friend recommended that tactic. My spinnerbait had just reached the edge of the grass, where it stalled momentarily on a tough grass stem. I raised the rod tip and gently pulled to free the spinnerbait.

The blade flashed as the lure pulled free. The swirl was huge. Where the water bulged, I caught a glimpse of the green flank of fish a lot larger than I was used to. I set the hook—and fell in love with bass in the grass. That first largemouth was in the neighborhood of 7 pounds. Since that morning, most of my really large bass—6 to 10 pounds—have been caught under similar conditions.



***Pete Elkins** (right) hoists a legitimate lunker he caught on a spinnerbait. It tipped the scales at a fraction under 10 pounds, and he released it. The author prefers a twin-bladed spinnerbait (above), and fishes it slowly through tufts of grass.*

There's obviously nothing secret about this pattern. In many ways, it's the most obvious of all shallow patterns, akin to magazine-cover lily pads where everyone knows bass live. But there the similarity ends, at least for me. While lily pads always look as though they should be filled fin-to-fin with bass, they rarely are. Furthermore, magazine covers aside, there aren't many lily pad beds of any size in most Carolina impoundments. Natural lakes and river systems are the exception.

Most impoundments in the Tar Heel state have lots of grass that's abundant seasonally. Not being a botanist, I don't know the names of the aquatic vegetation bass favor, so it's one of those "know it when you see it" propositions. The type that I like to fish most is found in scattered clumps of protruding grass that grow in less than 5 feet of water. Even so, some of the most productive areas are often much more subtle, with clumps of submerged grass barely visible below the surface. Although bass like the stuff, I don't do well in or like to fish coontail moss. In some fertile farm ponds, you may have no choice, but remember that the focus of these observations is on big lakes like Gaston, Buggs Island, the Pee-Dee and Catawba River lakes, and their connecting river systems.

I used to associate "bass in the grass" solely with springtime fishing. Although that's certainly the best time for this pattern, it is far from the only season when grass produces. Indeed, some of my best catches have come from such shallow areas in late fall and early winter. In the upper ends of major impoundments where current depresses water temperature, the pattern can last well into the summer months.

Also, grass beds and clumps near deep water are always worth some attention early

SUZUKI
OUTBOARDS
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Ranger

and late in the day even in the hottest part of summer when you expect fish to be deep.

As a general observation, the larger the grassy areas, the more difficult it will be to find the bass. Some areas have so much grass that the pattern in itself becomes worthless. In its heyday before salinity levels rose, Currituck Sound was a prime example and no doubt it will be again when wetter weather reduces the saltiness. With so much aquatic cover, more subtle cover considerations become important.

Anglers who have driven south to sample bass fishing in neighboring Santee-Cooper know what I mean about too much of a good thing. Try fishing a "bass in the cypress trees" pattern at Santee. You soon realize that bass simply don't live in every place that looks "bassy".

Assuming that you've located some grassy areas in your favorite waters, what's the best approach? Several lure types work for this kind of fishing. Spinnerbaits head the list followed closely by weedless spoons like the venerable Johnson Silver Minnow or some of its newer progeny. A bit farther down the list, but highly effective under certain conditions, are unweighted plastic worm or watersnake imitations. There are also some specialized weedless topwater lures that work.

Let's talk about these lures in reverse order. Down in the hydrilla and milfoil-filled TVA lakes along the Alabama-Tennessee border, local anglers often use soft plastic, vaguely frog-like surface lures that are distinguished by their deceptive ugliness, extreme weedlessness, and specialized effectiveness. These weedless wonders can be retrieved through the thickest milfoil bed, and the only thing that gets hung on them is a largemouth. They are also excellent choices for fishing the solid layer of duckweed that produces a green "scum" on summer shallows. I've seen big bass blow right through the green curtain in pursuit of an artfully plied weedless frog.

Not many large North Carolina lakes have significant duckweed blooms so common farther south. However, these lures work well where you find isolated duckweed conditions, and in the milfoil-rich Coastal Plain waters.

Unweighted plastic worms or so-called "snake baits" are especially effective in clear water around grass where there are open pockets. As a general rule, bass in such areas are also in shallow water since that's where most grass grows, and that leads to highly wary bass.

Wariness in clear water is increased on bright days with lots of sunshine, but this brings out the best in a plastic worm skimming on or just below the surface. Rigged weedless — either Texas-style or with a wireguard weedless hook — the worm can be cast into grass, retrieved through thick cover and allowed to sink into pockets, all without spooking fish the way bladed baits or flashier lures often do.

Strikes on swimming worms can be deceptive, and it's surprising how often you will miss the fish, all the more since you see the strike. This is true because there's a tendency to set the hook too quickly. Successful anglers force themselves to wait for a second or so to avoid taking the surface worm away from the bass. One good system is to hold the rod tip high as you swim the worm through the grass. When a bass swirls and the worm disappears, drop the tip towards the fish, hesitate a count or two, then set the hook hard.

Weedless spoons are good all-around grass lures, but don't get the heavy type used for jigging. The lasting popularity of the Johnson Silver Minnow with plastic or pork trailer among Currituck regulars is a testimony to the effectiveness of these lures in grass. These single-hooked spoons cast well, come through tangled cover wonderfully, and attract a lot of strikes. They are probably a better choice in clear water than spinnerbaits, yet most anglers opt for a spinnerbait first.

Why? Unfortunately, these weedless spoons tend to be a bit "fishless" at times. Anglers better than me may not have shared my misfortune, but for every largemouth I hook on these spoons, I miss at least two. They're exciting to fish, but not entirely frustration free. Still, it may be a matter of technique. I love to fish them simply because they perform so well in grassy alleys, and with more hook-setting practice, I may like them even better.

As for now, spinnerbaits head my list for bass in grassy areas, even though they tend to pick up a lot of weeds. Properly handled, however, a well-designed spinnerbait can fish all but the thickest types of grass. The trick is to have the lure under control even before it hits the water. So long as the blades are turning and the lure doesn't roll to either side, a spinnerbait is more nearly weedless.

If spinnerbaits aren't the most weedless, what are their assets? Most important, they are sure hookers, and in most cases, a strike equals a hooked fish. Spinnerbaits are also the most versatile because they can do almost everything most other lure types can. Used properly, they will produce even in clear water around grass, especially if the grass is thick enough to create impulse strikes where a bass gets only a glimpse at a lure before it's gone. In low light conditions or when the water is at least slightly tinged, spinnerbaits are the best choice. White, chartreuse, or any combination of these colors is effective, especially in murky water. In really clear water, I've enjoyed better results with darker colors, smaller spinnerbaits, and faster retrieves. When bass experts talk about "ripping" a spinnerbait, they're usually referring to a fast, near-surface retrieve that doesn't give a bass much opportunity to inspect the lure carefully.

Although single-bladed spinnerbaits are better for most conditions, I've found tandem-bladed baits too effective in grass for me to even consider anything else. If the water is tinged or murky, gold blades are hard to beat. If gold isn't available, copper or brass is better than nickle. In clear water, the reverse is often the case.

Despite the popularity of the big willow-leaf blades, my experience leads me to prefer smaller Colorado blades under most conditions, particularly during the spring months when a slower retrieve is normally best. Even so, a big willow-leaf spinner is extremely weedless in grass. Don't be misled into thinking that the only willow leaf to use is a giant blade. These monsters cast like hubcaps and can spook bass. Smaller blades are often better.

***The payoff** comes with this largemouth hooked in beds of grass (above). In spring, the best fishing is often in relatively shallow, dingy water around scattered grass clumps.*

Most anglers seeking bass in the grass use some sort of trailing attractor on their spinnerbaits, and plastic curly-tailed grubs are effective. A trailer seems to add stability to

the lure, increases its bulk, and adds some buoyancy. Buoyancy is a critical factor in lure presentation for bass in the grass. Generally, the slower a lure sinks, the more strikes it provokes. This is one reason why the Johnson Silver Minnow and similar lures have been around so long.

For that reason, I never fish a spinnerbait in the grass unless there is a pork frog trailer attached. The pork trailer makes it possible to inch my favorite Water Witch spinnerbait through shallow grass just below the surface. Bass also seem to hang on to spinnerbaits with pork trailers a few seconds longer, giving even my slowed reflexes time to react properly. Under most conditions, a green spotted frog pattern is my color choice, although a red and white pork frog can be extremely productive at times. A No. 11 pork chunk is pretty much the standard but a larger No. 1 chunk is even more buoyant. It's often a good idea to cut away the fleshy part of the chunk to improve hook penetration.

As far as lure presentation is concerned, the name of the game is "slow." Many times during the late winter and early spring when bass move into grassy, sun-warmed shallows, they will strike only lures retrieved very slowly. With spinnerbaits, keep the rod tip as low as possible during the retrieve. A fast-retrieve reel will help you quickly and firmly set the hook. Keep your eyes peeled for signs that bass are present. In large grassy areas, it's impossible to cast to every potential holding spot, but you can usually determine the best types of spots. On some days, every fish will be between grass clumps and the shoreline. The next day — or even that afternoon — they may be in isolated clumps of grass in the middle of sun-warmed coves well away from the shoreline. In the summer and fall, shad activity within the grass may provide the clue needed to focus your search. Cast beyond the intended target, and get the lure under precise control so that it can be presented exactly where you think a bass may be. Be quiet! Use your electric motor as little as possible, and on the lowest practical speed. Shorter casts are easier to control if water clarity doesn't demand a "fine and far off" approach.

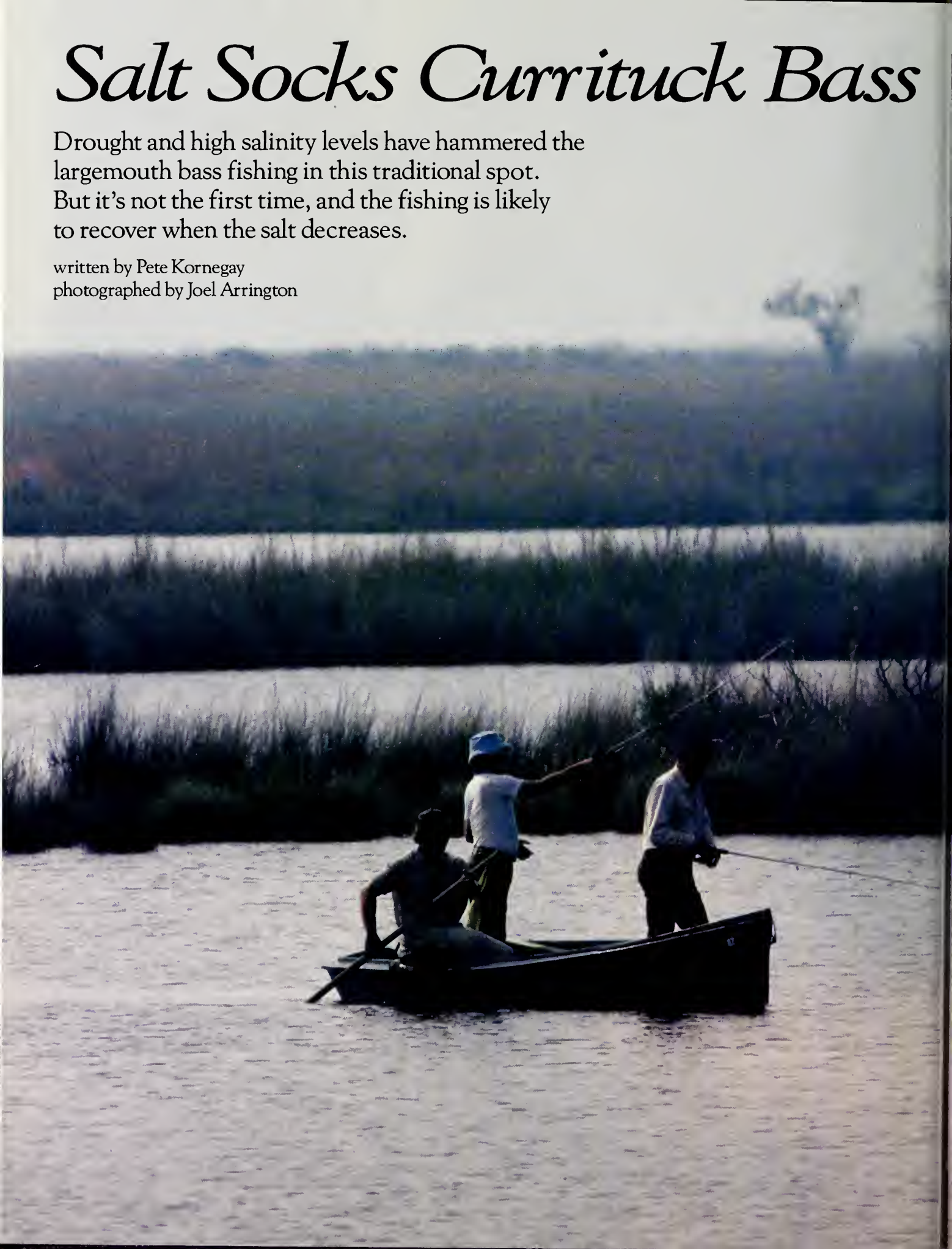
Fishing for bass in the grass is exciting, and it produces both fast action and large fish. Although at its peak in the spring months, the aquatic cover provides shade and cover for prey and predator alike even during the summer months.

If you've forgotten what it's like to catch bass in waters where your rod tip is the most accurate depthfinder, look where the grass is greener. ⊡

Salt Socks Currituck Bass

Drought and high salinity levels have hammered the largemouth bass fishing in this traditional spot. But it's not the first time, and the fishing is likely to recover when the salt decreases.

written by Pete Kornegay
photographed by Joel Arrington



During the past few years, the bottom has fallen out of one of the best traditional largemouth bass fishing spots in the world. Currituck Sound in northeastern North Carolina, long noted for its extensive brackish water bass fishery, no longer produces the great fishing that only a few years ago attracted so many anglers. The bass are gone — at least for the time being — and so are the sport fishermen who helped support an extensive local economy based on guides and related services.

Unlike some vast environmental changes, however, the culprit in this case is clearly known. Blame it on the weather. Several recent years of drought have increased the salinity (saltiness) of the water in this 40-mile-long estuary beyond the levels that can be tolerated by freshwater fish like bass, bluegills and crappie.

To understand what has happened — and what must happen to restore the Currituck's freshwater fishing to its former glory — it helps to understand what has taken place at Currituck historically. Such changes are nothing new for Currituck, and most have been caused by natural influences. The good news is that the sad state of Currituck's bass fishery need not be permanent.

Salinity levels in the sound have fluctuated a number of times within recent recorded history with varying results, and there is ample evidence that such fluctuations have been occurring here ever since the sound was formed.

On Church's Island, for example, ancient oyster shells left by Algonquin Indians are still strewn in the fields, mute testimony that the sound was once much saltier than now. Near Corolla, three stumps on the ocean beach suggest that Currituck was once a different size and shape and under the always changing nature of the Outer Banks.

There's little doubt that the close proximity of Currituck Sound to the Atlantic Ocean has given rise to the most dramatic and visible changes. Early maps of Currituck drawn from the 1600s through the 1800s show ocean inlets on the Currituck Outer Banks with names like Musketo Inlet, Old Currituck Inlet, New Currituck Inlet, and Caffey's Inlet. The fact that these inlets once existed is proof that the salinity of Currituck Sound has fluctuated dramatically throughout history. As far as we know, the last of these inlets (Caffey's) closed

***Until the recent** drought permitted salt to intrude on the relatively fresh waters of Currituck Sound, bass fishermen often made outstanding catches of largemouth bass along the edges of the marsh and around beds of milfoil.*

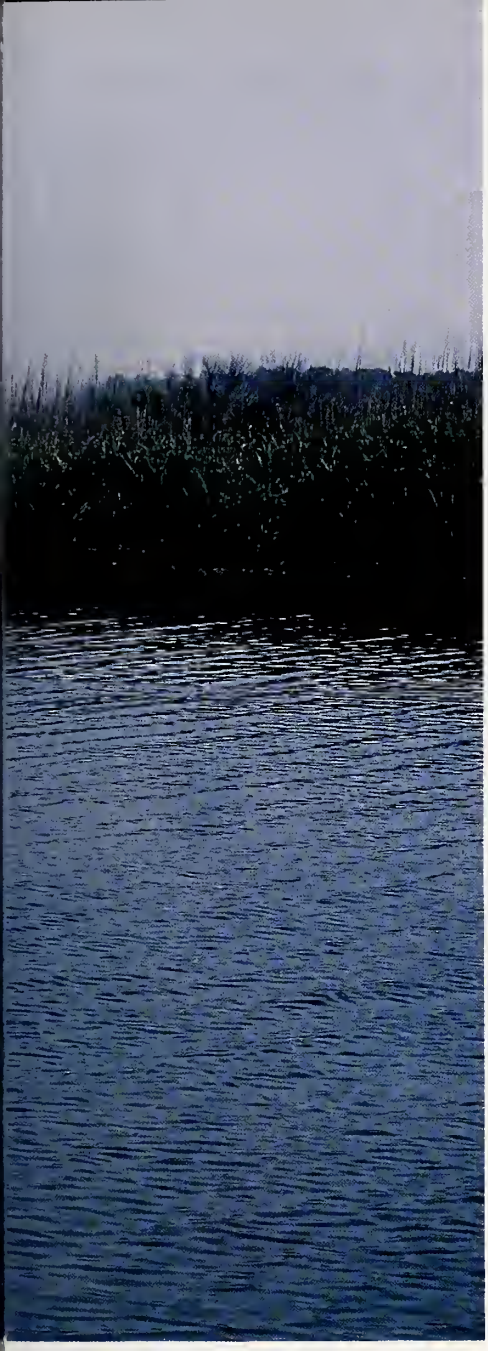
***Not only** has the increase in salinity drastically hurt the bass population, it has created a severe economic crunch for guides and other services that depend upon Currituck's world-famous bass fishing and waterfowl hunting. Because the sound is so big and open, all but the most experienced anglers have used guides to take them to the best spots and pole the boat in brisk winds.*

around 1830. Since then, no true inlets have been open. Even so, salinity has continued to fluctuate over the years.

In the early 1900s, salt water from the Chesapeake Bay flowed continuously through the recently completed Albemarle and Chesapeake Canal — now part of the Intracoastal Waterway — until locks were installed around 1917. These locks were operated sporadically through the 1930s and salinity increased in Currituck Sound whenever they were not in operation.

Ocean overwash across the Currituck Outer Banks from storms has also caused major increases in salinity from time to time. One of the most memorable weather events in history caused numerous breaks in the Currituck Outer Banks and sea water literally poured into the sound. This storm, known as the Ash Wednesday Storm, occurred on March 7, 1962. Winds raged and waves from the abnormally high tides breached sand dunes. There were millions of dollars in damages to homes and property. Overnight, Currituck Sound's normally fresh water was replaced by salt water. Largemouth bass were killed in some parts of the sound, but because there was no continuing influx of salt water, the sound rapidly reverted to fresh water. Damaged bass populations also quickly rebounded.

Why all of this concern about changing salinities? Simply put, freshwater fish cannot live in salt water, and saltwater fish can't live in fresh water. Aquatic plants, which attract wintering waterfowl to Currituck, also can't survive if the water is too salty or too fresh. This means that changes in salinity and the duration of a particular salinity level ultimately determine what lives in Currituck



Sound and what doesn't.

There are also factors other than salinity that have caused dramatic changes in Currituck Sound during recent times. In 1964, Currituck fishermen reported seeing a few small patches of an aquatic plant they had never seen. The following year, this non-native plant, identified as Eurasian Watermilfoil, was found to cover 100 acres of the sound near Knott's Island. By 1966, milfoil completely covered 8,000 acres of the sound with another 67,000 acres supporting a limited amount of milfoil. Most folks thought that this spreading menace would surely mean the end for Currituck Sound. The invasion of this plant into the sound over the course of a few years caused the most dramatic change in the sound anyone alive could remember. Suddenly, boat traffic was brought to a near standstill. Many duck blinds and fishing spots became inaccessible.

Legislators and congressmen were called. Studies were done. Chemicals were sprayed. And then, in the late 1970s, this exotic plant began to disappear on its own. To this day, no one knows why or how milfoil invaded Currituck Sound or what caused its retreat. Though there are still patches of milfoil here and there, it's obvious that native aquatic plants such as widgeon grass and sago pondweed are much more abundant now than during the heyday of milfoil.

In retrospect, milfoil appears to have been a mixed blessing for Currituck Sound. During the 1960s and '70s, the thick beds of milfoil were cussed and discussed, but milfoil probably supported one of the best largemouth bass fisheries in the United States. The dense beds provided ideal conditions for both prey stalking and cover for bass. The bass were not particularly large but the numbers were amazing. Fishermen learned to fish the milfoil beds with weedless lures, and it was not uncommon to catch and release 100 bass a day. People came from all over the country just to fish for bass in Currituck. People bought property and built homes in Currituck County just to be close to this fabulous fishing.

Besides the bass, wintering waterfowl populations also benefited from milfoil. In addition to being a good source of food, milfoil plants harbored small invertebrates also eaten by ducks. More important, the dense beds made many areas of Currituck Sound less accessible to hunters, fishermen and other boaters, thus providing needed resting areas for ducks and geese.

Over the years, Currituck Sound has been battered by storms, doused with sea water, and overrun with milfoil. Now, it's enduring yet another change, but one unlikely to be any more permanent than the others.

One thing, however, is obvious. Currituck Sound is not the same Currituck of 15-20 years ago. Since 1985, salinity levels have steadily increased to the point that most of the freshwater fish — including its vast population of largemouth bass — are simply gone. Drought is the reason for Currituck's latest change. Below-average rainfall, and Currituck Sound's relatively small watershed, have combined to allow salt water from the south to slowly but surely creep north into the sound.

How salty is it? During 1986, shrimp were caught in Tull's Bay and barnacles covered pier pilings. During the summer of 1988, a commercial fisherman caught a 17-pound tarpon in a gill net near Belle's Island.

You may ask how we can be so sure that

***As is the** case with most bass living in brackish water, those in Currituck's vast fishery were relatively small, averaging about 2 pounds. But larger bass were taken every year as shown by this 5 pounder (above). The late angling writer, Joe Brooks, unofficially holds the sound record for an 11 pounder he caught on a flyrod many years ago.*

***Until the** onset of the drought, the best fishing often occurred in May following several days of brisk southerly wind that flooded the marshes. When the wind fell calm creating ideal conditions, anglers might catch and release 100 bass a day up to this size.*

increasing salinity is the real problem in Currituck. As it turns out, the same situation happened in Back Bay, Virginia—a 25,000-acre bay connected to Currituck Sound by Knott's Island Channel. The only difference is that the salinity increases in Back Bay were man-made. In the mid-1960s, someone in Virginia had the idea that if sea water was pumped into Back Bay, the turbid water that existed at the time would be cleared and aquatic plants which attracted waterfowl would become more abundant. The city of Virginia Beach installed pumps and pure sea water began flowing into the bay.

From 1965 to 1974, salinity levels in Back Bay averaged 8 percent of sea water strength (largemouth bass, bluegill, and crappie can't live or spawn in water that has greater than 10 percent salinity). From 1974 to 1978, little sea water was pumped and freshwater conditions returned to Back Bay. Good bass fishing returned with the fresh water, and crappie and bluegill fishing was also outstanding. During 1980, 43 percent of all the citation-size bass caught in Virginia came from Back Bay.

Then in 1978, things changed again. A new and bigger pump was installed and from 1978 through 1986, sea water was again pumped into Back Bay bringing salinity levels well above 10 percent sea-water strength.

"We watched salinity levels rise steadily in Back Bay after 1978, and one of our best freshwater fisheries in the state crashed right before our eyes," says Mitchell Norman, fisheries biologist with the Virginia Commission of Game and Inland Fisheries. "Along with the freshwater fishery, aquatic plants which had always varied in abundance, disappeared."

After years of study and documentation by Norman and his colleagues, the Virginia Commission finally got the sea water pumping stopped in 1987.

"Salinity levels in Back Bay have since decreased to around 5 percent, and from our fish sampling during 1988, it appears that for the first time in years, freshwater fish may have successfully spawned in Back Bay tributaries," says Norman.

As a result of the recent drought, during 1985 and 1986, nearly all locations in Currituck Sound had salinity levels greater than 10 percent, and some locations were as high as 28 percent. The situation improved somewhat in 1987, but during 1988 most of the areas checked by N.C. Wildlife Resources Commission biologists still had salinity levels in excess of 10 percent. Unfortunately, there's no pump we can turn off for Currituck Sound. Until normal rainfall returns to northeastern North Carolina and salinity drops to below 10 percent, good freshwater fishing simply cannot exist in the sound.

Many fishermen have demanded that the Wildlife Commission do something about this situation. Some have suggested severe size- and creel-limit restrictions on bass, but this would have no effect since the bass aren't there. Others have suggested stocking Currituck with fingerling bass, but at current salinity levels, it would be the same as stocking largemouth bass in Oregon Inlet.

If there's any good news to be found, it's that this situation is not likely to be permanent. Relief from the drought is the key, and given what we know about growth rates and sexual maturity of Currituck Sound bass, we estimate that if salinity levels drop and remain below 10 percent in 1989, the re-

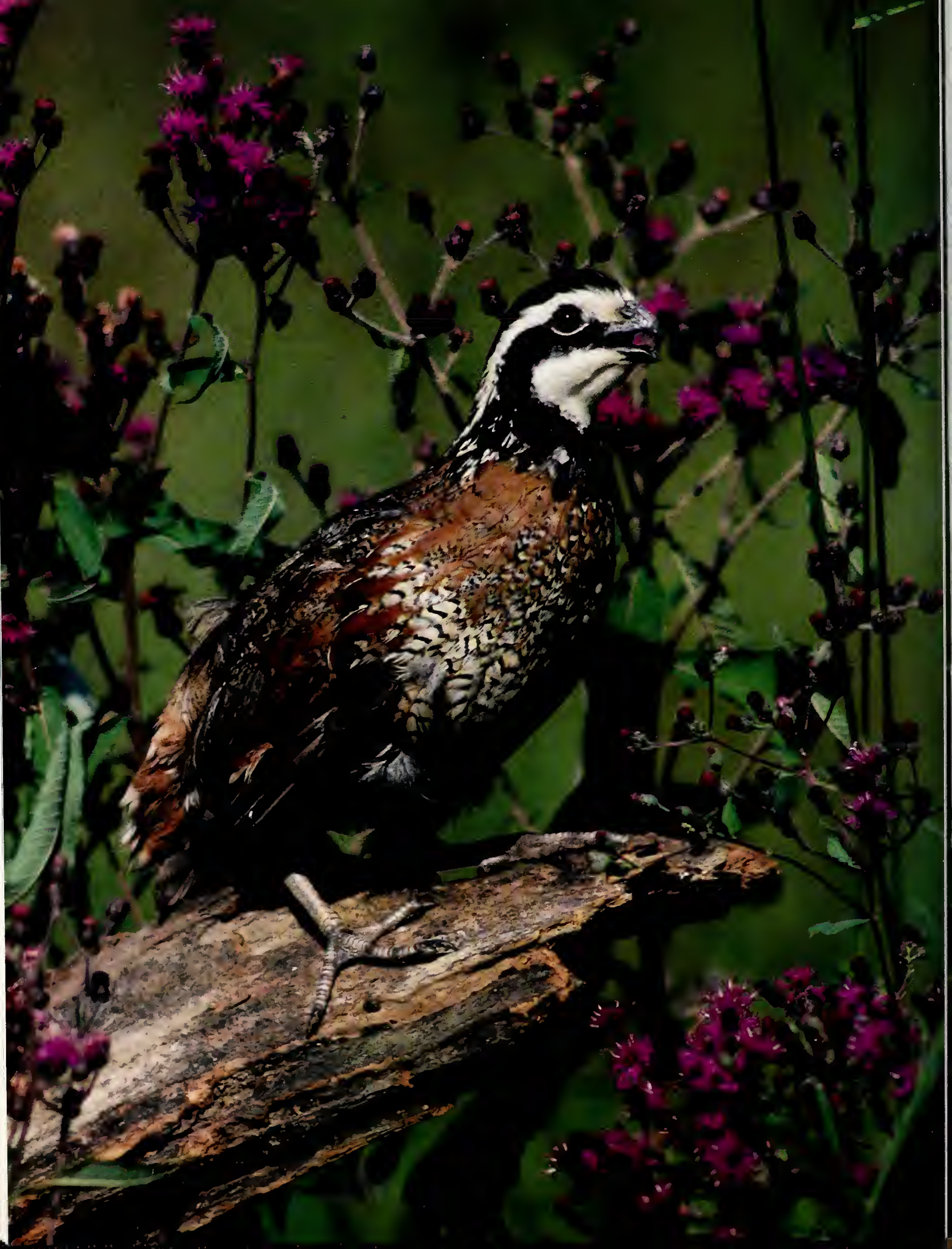
maining bass in the tributaries would spawn. It's estimated that these offspring might require three to four years to reach catchable size. Realistically, a period of five to 10 years might be required to reestablish a healthy, self-sustaining bass population in Currituck Sound.

To bass fishermen, this invasion of salt water into Currituck Sound may be the biggest threat to bass fishing in recent memory. But there's another threat — an unnatural threat — that may cause more long-term, permanent change than Currituck has ever experienced. Development of beach houses and condominiums on the Currituck Outer Banks during the past 10 years has proceeded at a frantic pace. New residential and vacation developments have also sprung up on the Currituck mainland. More and more people are coming to Currituck and it's likely that the sound will be caught in the middle. Already, most of this development is focusing on all available waterfront properties. This means marinas, parking-lot runoff, wetlands destruction, inadequate sewage disposal, shoreline bulkheading, electricity shortages, and other threats. Increased human disturbances also limit waterfowl use of otherwise adequate habitats.

Nor is spreading development the only threat. The U.S. Army Corps of Engineers is nearing completion of a new 2.6-mile canal, as well as renovating an older, longer canal. This $6.4 million project is designed to drain an urban and industrial area from Norfolk and Virginia Beach. Because of its potential to permanently increase the sound's salinity, and bring in storm runoff and pollutants, Currituck County has outlined its concerns to the Corps of Engineers. As of this writing, the new canal is slated to open in August.

Throughout history, Currituck Sound has withstood change and survived, and without man's influence, it can recover from the effects of drought. But the long-term outlook is not so bright. With the growing influence of man's activities, it's possible we could love Currituck Sound to death. ⊠

***Though most** fishermen used casting or spinning tackle with weedless spoons and pork rinds, Currituck held a special place in the hearts of flyrod enthusiasts. Will such fishing ever return? Historically, the sound has gone through many natural fluctuations in salt content and bass populations. When the salinity falls, the bass will almost surely launch a comeback unless development and pollution intervene.*



GETTING THE BEST FROM CRP

If the Conservation Reserve Program will pay money to improve wildlife habitat on your farm, why aren't you jumping at the chance? Here's what you need to know about the advantages and disadvantages of CRP — and why it's a big mistake not to check them out.

by Jim Dean

Thirty years ago, it was normal on the small farm I usually hunted to find at least two or three sizeable coveys of quail any day during the season, and I recall one day when we found seven coveys. We could kick up three or four rabbits any time, and their trails crisscrossed everywhere through the low cover in fields.

Over the years, however, the decline in small game on this farm has been dramatic. Quail are uncommon, and coveys may contain fewer than half a dozen birds. A rabbit is a true rarity.

This has occurred on a farm that has suffered less alteration than most. At a glance, it looks much the same as it always has — the same mix of fields, bottomlands, and woodlands with pine and hardwoods in various aged stands. Yet a practiced eye can pick out significant changes. With modern clean farming practices, the fields are now largely bare through the winter. You can walk out of those fields into mature woods anywhere without having to fight your way through heavy cover. The pine stands that provided good wildlife habitat the first few years after they were planted are growing up, and afford little cover or food. Wildlife habitat favorable to small game has definitely deteriorated.

Much the same is true throughout North Carolina and the rest of the Southeast where clean-farming practices and pine production have taken a big toll on farm wildlife habitat. Nor are the problems confined to the Southeast. Virtually everywhere in the nation, small-game habitat is disappearing.

Against this brief backdrop, enter the Conservation Reserve Program (CRP). Enacted by Congress in 1985 as part of the Food Security Act, CRP has been widely hailed as the most sweeping land reform since the Soil Bank program of the 1930s. But it has also been controversial. Some have called it a giveaway to farmers, and a boon to the timber industry. The wildlife benefits of the program have been widely publicized, yet biologists say these benefits have been greatly oversold. Are such charges justified? What has CRP really accomplished, and what does the future hold for it?

Two years ago, I helped my family install a CRP program on a farm in the Piedmont. We contacted the local offices of the U.S. Agricultural Stabilization Conservation Service (ASCS), which administers CRP, and the Soil Conservation Service (SCS), which provides technical services. We learned that the primary goals of CRP are to help farmers remove land from cultivation,

KEN TAYLOR

***The Conservation** Reserve Program has successfully removed land from cultivation and reduced soil erosion, its two main goals. However, on the farms of the Southeast where fields and woodlots are typically smaller (above), CRP's biggest impact, by far, has been the planting of 66,000 acres of pines — a practice wildlife biologists say is not favorable to small game.*

***The Conservation** Reserve Program has been widely publicized as a boon to small wildlife like this bobwhite quail, but is it? Roughly 110,000 acres of erodible farmland have been entered in CRP in North Carolina, but only 348 acres have been devloped specifically for wildlife. Nationally, of 28 million acres in CRP, only about 1.1 million acres are in the wildlife program.*

It's on the massive farms of the Midwest and Southwest that CRP has had its most impressive impact in removing highly erodible land from cultivation. On this Missouri farm, the planting of significant acres of native grasses under CRP (right) has also provided a greater benefit to wildlife species like the ringnecked pheasant (below).

RON NICHOLS

thus reducing commodity surpluses, and to control erosion of marginal cropland (with added benefits of reducing sediment entering streams and lakes). Secondary CRP goals encourage more appropriate use of some types of wetlands and floodplains, and restoration of farm wildlife habitat, especially for small game.

According to the terms of the program, we could enter a bid to convert mostly marginal and highly erodible cropland to one of three primary categories — tree planting, grass or wildlife cover. By agreeing to implement CRP practices during a 10-year contract period, we would get an annual fee that could help offset any loss incurred from crops no longer grown on that land. We also learned that in some areas, a farmer can also be reimbursed by a state cost-share program for a significant portion of the cost of installing CRP practices.

In the end, 20 acres of the farm went into wildlife cover, and six more acres went into loblolly pines. Because the farm is located in a county that offers reimbursement for installation of CRP practices, a substantial portion of the initial costs of plantings were paid by the state in addition to the federal annual payments.

It was a good experience with a good result, and one we would encourage for other farmers. The ASCS and SCS people were friendly and extremely helpful. But there were some surprises. The first was discovering that our farm was the only one in the county so far to opt for wildlife CRP acres. As a result, an SCS biologist had to be brought in to help work out a plan for the farm. This, however, proved an advantage to us because we were able to tailor the program to fit the particular needs of this farm and the kind of wildlife we wanted to encourage.

The second surprise was discovering that only 348 acres statewide had been entered into the wildlife portion of the program. How could that be, we wondered, for a program that has been so widely publicized for its benefits to wildlife? What might that reveal about the program nationwide?

To date, well over 28 million acres of active cropland have been converted to

RON NICHOLS

either trees, grass or wildlife cover throughout the nation. The final CRP acreage goals are even higher, but ASCS officials are already able to call the program a success, particularly in achieving the two major purposes of reducing land under cultivation and controlling erosion. Almost no one argues the benefits of these two goals, or CRP's early success in achieving them.

"Nationally, we have met about 65 percent of our goal, resulting in soil-loss reduction of 600 million tons per year," said Mitch Clary, assistant state conservationist with SCS in Raleigh.

As for the secondary goal of improving wildlife habitat, CRP has been less successful. Of the 28 million acres of former cropland in CRP, about 22.7 million acres have been brought into the program either as introduced grasslands (16.5 million acres) or native grasslands (7.2 million acres). As expected, most of the conversion to grassland has taken place in the Midwest. More than 1.6 million acres has been converted to tree culture under CRP, almost all of it in the Southeast. Again, as you might expect, the trees planted have almost all been pines. Nationally, only about 1.1 million acres of active cropland have been converted to wildlife habitat — a small portion of the total.

In the Southeast, the division of CRP categories puts wildlife at an even greater apparent disadvantage. North Carolina, for example, has converted nearly 66,000 acres of farmland to trees (pines) under CRP, while more than 44,000 acres have been converted to grasslands. Compare this to the miniscule 348 acres in wildlife cover.

ASCS and SCS officials argue that these apparently small wildlife benefits are misleading because the conversion of cropland to grassland and tree farming improves wildlife habitat. (That claim is widely disputed by most wildlife biologists, however.) ASCS and SCS officials also say that wildlife is aided by CRP provisions that enhance established grassland and existing trees. This claim has drawn less fire from wildlife biologists, and especially for fields converted to or left in native, rather than introduced, grassland.

The same cannot be said on lands where pines are planted. Here, wildlife benefits may occur early, but tend to last only a few years. Once a stand of pines grows tall enough to shade out low-growing cover, it provides little cover or food for wildlife. Indeed, wildlife biologists consider uniform, thick pine forests virtual wildlife deserts.

Furthermore, despite the lopsided number of acres converted to tree production in the Southeast, CRP tree planting has reached only about half the national goal, and reaching that goal will mean even more conversion to trees in the Southeast.

LYNN BETTS

***This vast** field of native switchgrass on a farm in Iowa (above) not only provides erosion protection and helps reduce commodity surpluses, it furnishes food and cover for small game. CRP also has the potential to retire marginal and erodible cropland and provide multiple benefits on large clean-farming operations like this one in eastern North Carolina (right).*

"We would like to see more CRP acreage in trees, and the tree-growing states are predominantly in the Southeast," said Jack Webb, branch chief of Land Retirement and Water for ASCS. "Most of the CRP tree acreage has gone into South Carolina, Georgia, Florida, Alabama and Mississippi, and to meet our goal, we especially need for the southeastern fringe states to plant more trees."

Though perhaps less controversial, the CRP grassland policy has also drawn fire from some wildlife managers, especially where fescue is planted rather than native grasses. Fescue quickly develops into a dense sod, choking out many desirable food and cover plants and restricting travel of small game. In addition, there is some evidence that a fungus that occurs in many fescue stands may in fact be toxic to rabbits. There is also evidence that infected fescue is poor livestock forage that can result in health problems and weight loss in livestock maintained year round on fescue pasture.

The 1990 Farm Bill Work Group of the U.S. Fish and Wildlife Service notes that fescue is being recommended for CRP acres despite these potential problems, and despite the possible overabundance of existing fescue pasture. Among its recommendations, this group urges that native grasses and legumes be more widely substituted. In some parts of the nation, particularly the Southwest, native grasses are being more generally recommended, and actually comprise the largest percentage of CRP acreage, because they grow better in the arid climate. Where existing stands of native grasses are being encouraged or new native stands established through CRP, most agree the benefits to small game will be more substantial.

This past summer, another problem involving CRP grasslands reared its head. Although those concerned hope it will not happen again, CRP's benefits to wildlife — especially waterfowl and small game — were diminished during severe drought when

KEN TAYLOR

farmers in the Midwest were permitted to mow grasses on CRP acres for use as livestock forage. Wildlife biologists believe this may have had a significant impact on duck-breeding success in the upper Midwest. Regardless of your loyalties, there is no doubt that farmers faced a serious crisis, and this tradeoff may have little long-term impact on the overall success of the CRP program — unless, of course, such haying becomes an annual event and a precedent for other routine exceptions.

While it may be accurate to suggest that CRP has so far achieved only limited success in restoring small-game habitat, such an assessment overlooks this program's vast potential as a wildlife tool. To a great extent,

Rabbit populations have declined drastically in North Carolina, and although CRP has had little or no impact so far in reversing this trend, the program has potential if farmers can be enticed to use it.

KEN TAYLOR

however, tapping this potential will depend upon individual farmers, and they simply haven't embraced the wildlife portions of CRP.

The problem is largely economic. Few farmers can afford to give up even marginal cropland — and certainly not cropland with lucrative support crops like tobacco or peanuts — merely for the annual Federal CRP payments which may average only $45 an acre annually (the amount can vary depending upon the farmer's bid and its acceptance). Therefore, farmers are confronted with several choices. They can choose not to opt for CRP acreage and simply leave their land in crops. Many of them make this choice because they don't want to lock up any land for 10 years when they don't know whether or how they might need it.

Most of the farmers who have opted to take part in CRP have chosen to plant trees. They may have been encouraged to do so through cost-share programs to help meet national CRP tree goals, but that's hardly the main reason. Unlike wildlife, trees represent a future cash crop.

To some extent, the same is true of grasslands. Farmers who don't want to lock up land for decades while trees are growing may choose grass cover instead of trees to keep the fields open, and also because they can be more easily converted to pasture once the 10-year contract has ended.

But when it comes to choosing cropland to place purely in CRP wildlife plantings, the incentives are less obvious. The farmer gets erosion control, additional reimbursement of a percentage of the costs of planting wildlife cover in some counties, and also the annual CRP payments — the same as for other CRP acres. Also, as with grasslands, choosing the wildlife CRP alternative will leave the fields open. But the biggest incentive is not economic, rather simply a desire to increase small game and other wildlife on the farm.

One possible economic benefit is that improving a farm's wildlife population can make it more desirable to hunting groups that might lease the rights to hunt there. True enough, but some landowners may not consider this an asset. Some may want to keep the good hunting to themselves, assuming small-game populations rise, of course. Others simply don't want the added potential problems that may arise with leased rights, especially since fees for such rights have traditionally been rather small. Some landowners are also concerned about liability.

On the plus side, some landowners have found that responsible hunting groups value their privilege and take extra care with the land, even making improvements through group projects and helping control illegal trespass.

Already, leasing hunting land to sportsmen's clubs or groups is a widespread practice in North Carolina and elsewhere, but mostly where large corporate tracts are involved and fees are larger. For better or worse, this is a trend that will grow, and it's one even small farmers may want to investigate before ruling out a CRP wildlife option.

With all these considerations, is there any absolute conclusion one can draw about CRP? Yes indeed. Any farmer who does not take the time to learn about this program and see how it can be applied to his land is making a costly error — and not just for the wildlife benefits.

In most cases, farmers can get all the information and help on CRP they need by going to their county ASCS, SCS and extension service offices. Officials will explain the bidding procedures for CRP signups, and all the other necessary steps.

In addition to annual federal CRP payments, your local federal official can advise you of any reimbursements you may be able to get to cover a percentage of installation costs from the state. State cost-share programs to cover a portion of the installation costs are not available in every county — or every state — and the amounts vary. North Carolina is fortunate in having a better cost-share program than most states.

If a farmer opts to put qualifying acres in tree plantings or grasslands, he'll find a well-planned program with experienced assistance from people he may already be working with on other farm programs.

If, however, he wants to enroll acres in the

KEN TAYLOR

***Research at the** N.C. Wildlife Resources Commission's Penny Bend area is revealing restoration practices that can be beneficial in improving rabbit and other small-game habitat — practices that could be part of your farm's CRP wildlife program.*

KEN TAYLOR

***From a** small-game standpoint, the biggest problem with CRP to date has been farmers' reluctance to enter acres into the wildlife portion of this vast program. As more farmers learn of the advantages, however, the outlook for these quail hunters and their quarry will improve.*

CRP wildlife category or some other less popular CRP category such as bottomland protection or filter strips, it may be slightly more difficult simply because officials in some local offices are not as familiar with these parts of the program. And, as mentioned, certain CRP programs are not available in every county.

"I would advise those seeking information on CRP wildlife acres to be more persistent," said Clary. "Not every local office has thoroughly read all the material concerning this overall program, and especially those sections they may not need to deal with on a daily basis. If you encounter local officials who aren't familiar enough with the wildlife option, you should contact your ASCS district director or SCS area conservationist. They will get you headed in the right direction."

There will be at least one more signup for CRP this summer under its present authorization, and ASCS and SCS both say they expect the program to be extended with additional signups. If so, some adjustments to improve the overall CRP program are also anticipated.

Though many changes have been suggested and are being considered, one particularly affects farmers in North Carolina and the rest of the Southeast. At present, a farmer cannot simply pick and choose the parts of fields he wants to enter into CRP. Indeed, he cannot divide a field unless that field is at least 9 acres. There are far fewer fields 9 acres or larger in much of the Southeast than there are in the Midwest, and the overall CRP program is basically designed to apply to Midwestern farms with massive fields where cropland reduction was deemed most desirable.

The 9-acre limitation works at a disadvantage not only for wildlife and for farmers in the Southeast, it also limits some of the goals of the overall program. For example, a farmer might split a 3-acre field if he could save the 1 acre of prime crop land and put the other 2 highly erodible acres in trees, grass or wildlife CRP. But with the 9-acre limit, that's not possible. The farmer must include the entire 3-acre field or leave it out.

Many, if not most, farmers opt to simply leave such fields in cultivation. If they do choose to put them into CRP, they're most likely to plant pines because of their long-range economic investment.

If farmers could split fields, they would be far more likely to sign up for more CRP acres — including wildlife acres. Furthermore, there would be greater incentive for them to help achieve the national goal of protecting more acres of highly erodible land.

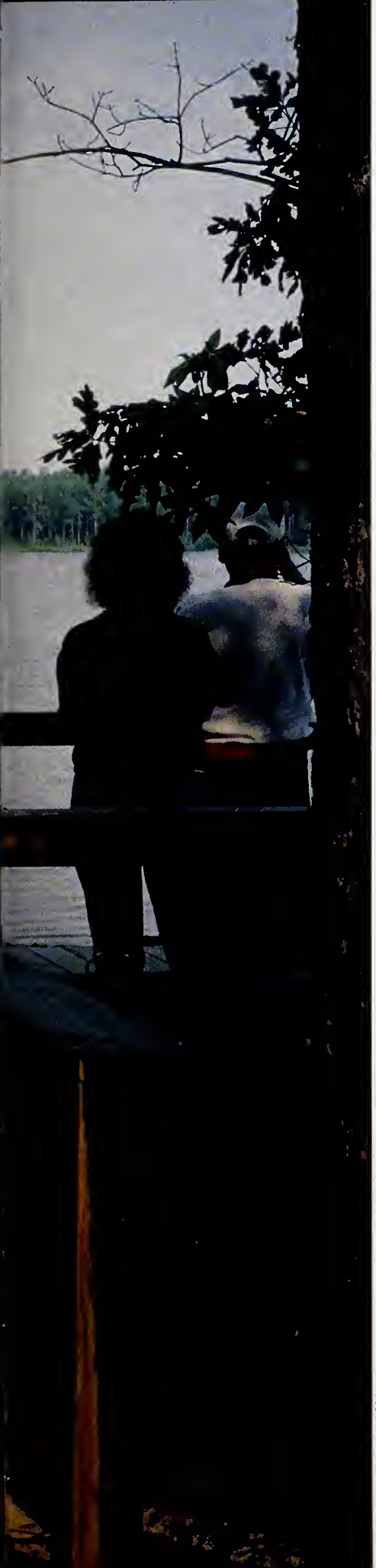
"This suggestion has been made, especially by farmers in the Southeast," said Webb. "The reason it wasn't part of the original national program is that we didn't want to subdivide large tracts in the Midwest for purposes that might be questionable."

Another likely reason is that further subdivision of already small fields in the Southeast would complicate record-keeping of field crop histories necessary for various agricultural programs. It's a valid point, but may need to be reconsidered in light of the erosion benefits, removal of cropland from cultivation, and additional incentives for farmers to sign up. After all, many fields in the Southeast were established decades ago before farmers learned better ways to divide their land for optimum benefits.

In all likelihood, CRP will continue to be controversial, and there are problems that may need remedies. And yet, CRP is indisputably achieving some of its major goals, and it also has the potential for restoring wildlife — especially small game. If that's your interest, you should pay a visit to your local ASCS and SCS offices.

For us, it's been a bit of trouble. But for at least the next 10 years, this land will no longer grow marginal crops that barely pay their costs, nor will it erode as it once did.

And if all goes as planned, even the old bird dog may live long enough to see a few more bobwhites hereabouts. ☒



JAMES D. KEIGHTON

***Immature eagle** soars over Jordan Lake.*

Where Eagles Dare

Jordan Lake has become a regular stop for bald eagles, and there's even a special observation station where visitors can watch these magnificent guests.

by Jane Rohling

One spring day in 1985, Kathy Kuyper slipped her kayak into the waters of Jordan Lake in Chatham County and made headlines. She had seen an eagle or two in the area before, but on this April morning she saw seven eagles perched in a single tree. Something unusual was going on at Jordan Lake.

For years, even one eagle sighted in North Carolina had been considered a newsworthy event. After all, the bald eagle (*Haliaeetus leucocephalus*) is an endangered species in North Carolina and 42 other states. It's threatened in five more. Declines in the early 1900s were attributed largely to shooting and habitat destruction, both of which continue to be a problem in spite of state and federal laws protecting eagles. But the big drop came in the 1940s and 1950s, when the accumulation of DDT and its metabolites in the food chain caused eagles and other predatory birds to lay eggs with shells so thin they could not be incubated.

Kuyper, who was then president of the New Hope Audubon Society, reported her observations to other Audubon Society members, the N.C. Wildlife Resources Commission, and the U.S. Army Corps of Engineers. She organized a crew of biologists and birders that in June 1985 conducted the first eagle census on Jordan Lake. Much to everyone's surprise, the survey turned up over 30 eagles!

Since that first count, Jim Keighton of New Hope Audubon and Corps biologist Steve Brown have coordinated simultaneous eagle counts on the third Sunday of every month on both Falls and Jordan lakes. To date, the highest count was in June 1987 when 64 eagles were sighted at Jordan Lake. Today a sight usually associated with pristine wildernesses has become almost commonplace in the Research Triangle area.

What attracted this mysterious swarm of eagles to the Triangle area? Though much remains to be learned about eagle behavior, one answer is the banning of DDT for crop use in 1972. Since then, eagle populations have recovered so quickly that one expert says he's not surprised at the eagle convention at Jordan.

"East Coast eagle populations are expanding at a pretty rapid rate, and I'd expect to see an increase in their numbers at Jordan and Falls lakes, as well as other areas," says James D. Fraser, assistant professor of wildlife science at Virginia Polytechnic Institute

JAMES D. KEIGHTON

***The astonishing** eagle gathering at Jordan Lake draws birdwatchers from across the state. A wildlife observation deck enables people to watch the eagles without disturbing their roost.*

Scientists say banning of DDT in 1972 partially explains the abundance of eagles at Jordan Lake. The pesticide decimated eagle and other raptor populations in the 1950s and '60s. Though eagles have increased, the large communal roost at Jordan is still unusual.

JANE ROHLING

in Blacksburg. Fraser, who has studied bald eagles in the Chesapeake Bay area and Minnesota, was contracted by the Corps in 1986 to coordinate a two-year field study of the eagles at Falls and Jordan lakes.

Large communal summer roosts, like those at Jordan Lake, are still rare, however. Three roosts exist in the Chesapeake Bay area, where there are also 181 breeding pairs.

The eagles in the Triangle are hanging around where the fishing is good. They gather to "roost" at a couple of communal sites in the evening, but they are not "nesting" here. Many people have confused these terms. A roost is simply an area where the birds congregate to rest, especially during the night. A nest means that adults will be raising young. There are a few active eagle nests in coastal North Carolina, but eagles have not been known to nest in the Piedmont. There is some evidence this may soon change. In 1987, one nest was started in the Triangle area and then abandoned and taken over by a pair of great horned owls.

Biologists believe that most of the Triangle's eagles are of the southern subspecies — birds that have wandered north after having nested and fledged their young in Florida during the late winter months. They arrive in large numbers in late April or early May, and most have departed by late September or early October.

The only tangible clues we have about the travels of these eagles are the sightings in May and June 1987 of three birds that had been trapped and radio-tagged in 1985 and 1986 on Chesapeake Bay. Signals from these eagles had been picked up over the previous couple of years in both northern Florida and Chesapeake Bay.

"The reason the birds are there," Fraser explained, "is that there are several key factors available — fish in the lake, some relatively undisturbed areas (including some good roosting habitat), and fairly big trees around the shoreline with open canopies that the eagles can fly into easily."

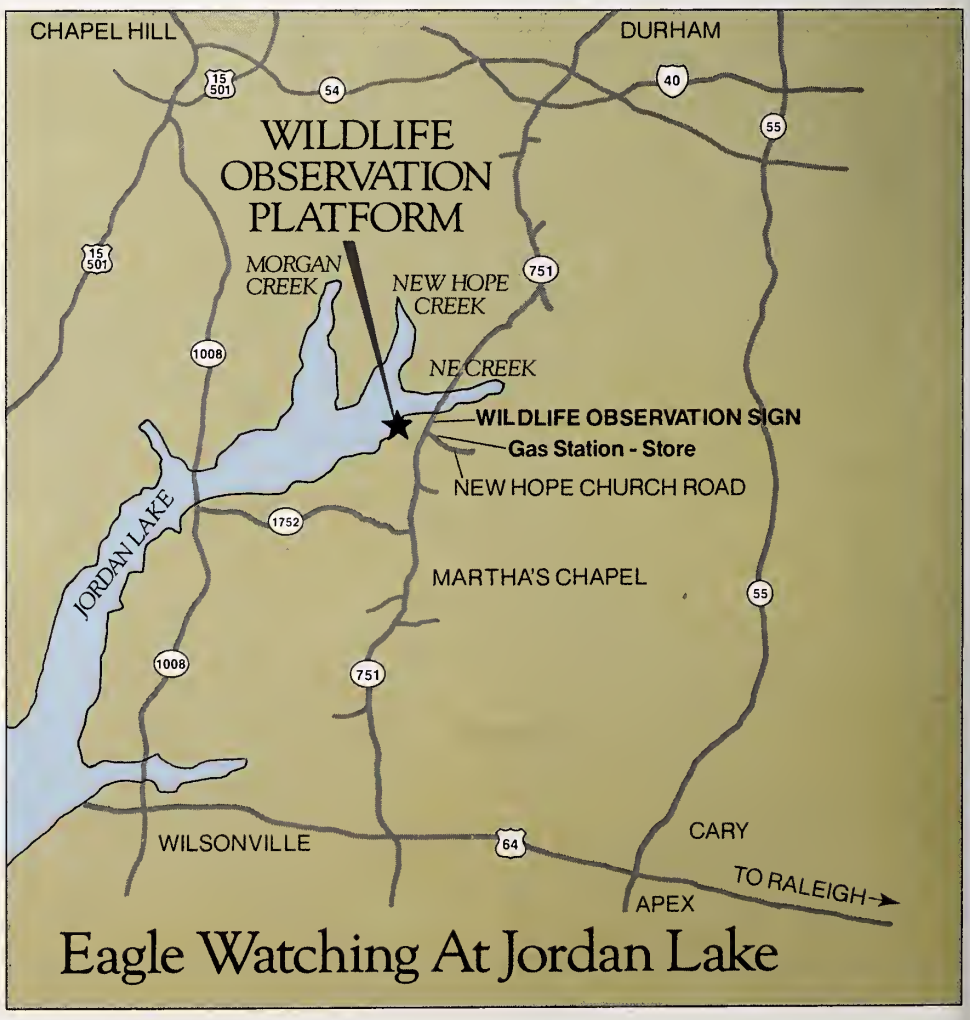
Because bald eagles feed mostly on fish (supplemented by a few waterfowl species during the winter), they tend to follow watercourses as they travel. Scientists suspect they may have been migrating between Chesapeake Bay and Florida, with side trips up the Cape Fear, Haw and Neuse rivers, when they stumbled across the newly created reservoirs with their booming fish populations.

Will they continue to visit these reservoirs? Perhaps, but the Triangle's rapid population growth will bring with it more development around the lakes and increased recreational use of the lake. Fraser and Keighton are concerned that this may be more disturbance than the eagles will tolerate.

Fraser's research centers on looking at the areas the eagles are using to perch, hunt and roost, and on observing their reaction to various kinds of human disturbances. "We found the birds in greatest densities where we didn't find people," he notes.

High levels of boat traffic and heavy recreational use of the shoreline drives the eagles off their fishing perches so they can't feed. Fortunately, low-water levels during much of the summer and fall naturally restrict recreational activities in some of the shallow bays frequented most by the eagles, but if the eagles are to keep returning, further concessions may be necessary.

"The worst thing," Keighton believes, "is to approach their evening roost sites, even if it's only to see the eagles. They will leave the area if they can't have a place to their liking to sleep undisturbed at night." This has been a problem at Jordan Lake, where too many people have discovered the location of one of the communal roosts. The eagles have reacted by moving farther back into the trees, away from a nearby road. Biologists and foresters with N.C. State University have tried to help by managing timber to



Eagle Watching At Jordan Lake

JANE ROHLING

***Eagles like** to roost in an undisturbed area with tall trees and an open canopy, and with good fishing nearby. Portions of Jordan's shoreline fit the prescription superbly. Birdwatchers have seen 64 eagles on a single day at the Piedmont lake.*

create more sites that resemble the conditions at this roost in less accessible areas.

Perhaps the biggest help has been the construction of a wildlife observation deck on the lake shore near Indian Creek on the northeast part of Jordan Lake. It is located on the branch of the lake that is most heavily used by the eagles, so chances of seeing them are excellent. Yet it is located far enough from the roost to keep the people from disturbing the birds.

"Having people come to a particular spot, such as the observation platform, where the eagles and other wildlife can get used to seeing them, helps the animals feel much more at ease," says Keighton.

The response of the public to this viewing opportunity has been overwhelming. Between its construction in August 1987 and January 1989, a total of 3,780 people have signed the register, and this is undoubtedly less than half the actual number of visitors. Visitors have come from 44 North Carolina counties, 36 other states and 12 other countries, all with the hope of catching a glimpse of a bald eagle in the wild.

Even when eagles fail to show up, there's lots more to see. Visitors have recorded observations of 98 other bird species, six mammals, five species of reptiles, four butterflies, and a swarm of honeybees!

Visitors, ranging in age from babies in backpacks to senior citizens, have made the ¾-mile trek from the parking area off N.C. 751 to the lakeshore. All have treated the area with respect—there have been none of the vandalism and litter that plague so many of our parks. Their comments have reflected great appreciation for this unique recreational opportunity, and a desire to see more places like it. They call it "a great gift" . . . "an island of sanity." One person summed up his experience by writing: "I was in awe. This is perfect!"

On a recent morning, a hush came over a small group gathered on the observation deck. Several pairs of binoculars scanned the treeline to the west. Someone had just spotted a dark speck on the horizon. Was it an eagle? All eyes focused intently on the bird, checking to be sure there were no long heron legs trailing behind. They looked for the characteristic heavy wing-beat, the flat profile of the wings in a glide, the glint of the adult's white head and tail in the morning sun. Then a cheer went up from the group. Yes, it was an eagle, an American bald eagle, our endangered national symbol.

A sight once rare, and likely to have been lost forever, is now common here. What's it worth? To scientists, it's a key to the health of our environment. To those who see an eagle, it's a foolish question.

Fishing With The Real Thing

Natural bait is still often the best choice for anglers who want to catch salt water fish. Here are some tips on what works best.

written and photographed by Joel Arrington

Baits are basic to salt water fishing. Skills involved in locating, catching, keeping alive and using baits are essential to consistent success. Even purists—and there are very few of them—who insist on using only artificial lures need knowledge of baitfish in order to better imitate them.

As the technique of slow-trolling live bait grew and swept the South during the past 10 years, more anglers became adept with cast nets and learned how to keep baits in a live well. Competitive fishermen know that their first task is to secure a supply of bait and keep it alive and well all day. So it is for all saltwater anglers.

No doubt one of the most important skills among many in the coastal angler's spectrum is handling cast nets. They are circular nylon nets that can be thrown so that they open over bait, sink to the bottom and are closed with a line attached to the angler's wrist, something like a purse string. Cast nets come in a variety of sizes (measured by the radius), a range of mesh sizes for various baits and sink rates, and with varying size lead weights around the edge. Three-foot nets are about the smallest made. A 12-footer covers a 24-foot diameter circle and is about all a tall man can handle. Ready-made cast nets range in price from about $12 to $200 and more for customized models.

The smallest cast nets are useful for catching a few minnows along the beach or sound shore. Anglers who want menhaden and big mullet need a net that spreads wide and sinks quickly to capture fleet baits. A big net is much harder to throw properly than a small one.

Everybody has his own style, but the trick is to pile the net on one arm and shoulder in such a way that, when you throw it, it will open wide before hitting the water. Some casters hold a sinker in their mouths during the cast to assist the net in opening, but they must remember to release it at the last moment or risk losing teeth.

While a bucket will keep a few small baits alive for a brief period if you keep changing the water, the best tanks or live wells for boats are rounded if not perfectly round. Menhaden, especially, have a habit of nosing up in the corners of a rectangular well and suffocating. They need a circulating source of well-oxygenated water. The more fish you carry, the bigger and better your tank or well needs to be.

While built-in live wells in the decks of fishing boats are out of the way, they are inconvenient. You have to stand on your head every time you need a bait. Consequently, many fishermen install round or oval plastic tanks on the deck usually near the stern. They might hold 15 to 50 gallons of water and are in everybody's way, but seem to be the best solution. The lid is about knee-high or higher, and most boats are rigged to scoop and circulate water through the tanks while underway. Pumps or aerators kick in when the boat is at rest. Such a system will keep a hundred or more large menhaden happy all day

***Though artificial** lures are increasingly popular, natural bait is still the surest choice for anglers fishing salt water. Bait on a bottom rig caught this bluefish (left). This angler (right) uses a cast net to capture minnows in the surf to use as live baits for flounder.*

***Most saltwater** gamefish big enough to eat menhaden prefer them over most other live baits. Large circular live wells with ample aeration will keep these baits alive and handy. Menhaden are particularly favored by fishermen who slow troll for king mackerel.*

even in the middle of summer.

Fishermen have had limited success keeping menhaden overnight. Pumps tend to fail at inopportune moments. One angler told me he had tried suspending a net beside his dock from a floating circle of PVC pipe, but said there was too much mortality with nylon net. He was about to experiment with cotton netting, which would not be so abrasive.

Experienced fishermen like fresh baits every day, however. According to David Franklin, one of Wilmington's best offshore anglers, "Once menhaden get the slime scraped on them, they don't seem to attract so many strikes." He tries to catch new baits every morning, dumping the previous day's supply when his fresh bait is secure.

More pounds of menhaden are harvested annually by the American commercial fishing industry than any other species. The number taken by sport fishermen is inconsequential by comparison. These fish congregate in schools numbering up to 200,000. Often cast netters can find some in a marina or creek or other protected water and catch enough for a day's fishing in one throw. Before cast nets became commonplace, we used to snag them with Hopkins lures or weighted trebles.

Menhaden are the bait of choice for slow-trolling. There are exceptions, but mackerel especially seem to prefer these soft-rayed fish. Amberjack might prefer a larger bait, but nearly everything likes menhaden.

Several species of saltwater minnows are also useful as bait. Marsh minnows, also called mummichogs, encompass several brackish water species that are easy to catch in a small-mesh cast net or trap and are quite hearty. Ben Doerr, a surf guide at Avon on Hatteras Island, said he used to catch them commercially as a child near Norfolk, Virginia.

"I sold them by the quart to bait dealers," he said, "and I just put them between layers of wet burlap. You can keep them like that for 24 hours or more, even in hot weather."

Mummichogs are tough, stay on a hook well, and are good for red drum, bluefish,—virtually all but the largest game fish—but particularly for flounder.

Perhaps the most important baitfish species overall is the jumping mullet. There are two main species on the Atlantic Coast (the striped and the white), four minor species in the Atlantic, and many more

throughout the world. In the fall, mullet move from the sounds through the inlets, where they spawn in the open sea. Gamefish are keyed to exploit these migrations. For example, in September and October, big Spanish mackerel move into shallow inshore waters to feed on the bigger mullet coming out of the sounds.

Commercial fishermen catch mullet, which are plankton eaters, in nets to supply dealers. For much of the year you can buy fresh mullet — far superior to frozen — at most coastal tackle shops. Cast netters can catch their own. It's easier at night, and easier from a boat where you have a better angle, but you can do it from bridges and creek banks. Get a bag of poultry laying mash, and throw a few handfuls in shallow tidal water after dark. Return in a half-hour to throw your fastest-sinking net over the baited spots.

Bob Eakes of Buxton has honed live bait fishing for Spanish mackerel to a precise technique. He fishes all summer with finger mullet live-lined from a boat and later from the beach. He catches his bait with a cast net right in the surf. His rig consists of a 4X strong size 6 treble (the Eagle Claw 777SSR) on 2 feet of No. 2 or No. 3 wire, and a No. 1 black barrel swivel. A bank sinker sufficient to cast goes on the line above the swivel. He fishes this terminal rig on light line mostly for Spanish, but also for red drum, king mackerel, false albacore and bluefish.

Mullet come in sizes colloquially known as finger, corn cob and horse. Live corn cob and larger mullet are absolute death over offshore wrecks, luring king mackerel, amberjack and cobia into vicious strikes. Finger mullet are about right for most inshore fish, and all sizes are cut up or used whole in surf fishing.

Pinfish are another good bait, but probably not as good as menhaden or mullet. Their advantage is that they are almost always available in some numbers. When there is not a menhaden flipping anywhere and no mullet to be found, you can usually drop a piece of bait on a small hook beside a dock or bridge and catch several pinfish. With them, you can catch king mackerel as well as nearly anything else that takes up residence beside a wreck or buoy.

Among the many miscellaneous fish species used as bait are the alewife (much like a menhaden), needlefish, bluefish, hogfish, and the various small bottom fish you catch around wrecks, such as spot-tail bream and grunts.

I have used big croakers for amberjacks at the Wrightsville Beach artificial reef. We once used live gray trout about 12 inches long to catch cobia near the Cape Lookout jetties. Bluefish are excellent king mackerel baits. In fact, you can feel confident in using virtually any small fish you can catch in a net or on a small hook, with this exception: fish caught inshore and transported to a wreck are much more effective than any bait you can catch at the wreck.

Why live shrimp are not more widely used in North Carolina has always been a mystery. Virtually every bait shop from South Carolina to Mexico sells them and they are in much demand everywhere for anglers. Yet virtually no Tar Heel shops sell them. Hardly a gamefish swims that does not relish shrimp, particularly a live one.

Shrimp are easy to catch between May and November in a cast net if you bait a few spots in a shallow tidal creek. About dusk, mix canned dog food and sand in a bucket and drop a handful beside a stake you have stuck in the bottom to mark the spot. Bait several places like this and return after about an hour. Throw your net over the spot beside the stake, and you will likely have several big shrimp.

Keep them in an aerated bucket if you want to fish them alive. If that's not necessary, you can drop them in a plastic bag full of salt water and place them in your cooler with ice as long as you keep fresh water off them.

Blue crabs and fiddler crabs are good baits for a number of species, but they are indispensible for tautog and sheepshead. Both have it in their genes to eat crabs, sometimes to the exclusion of anything else. You can catch fiddlers in a trap or sometimes by digging them out of their burrows in marsh creek banks. Their pinchers can't break the skin, so don't be afraid to grab one. Be careful handling blue crabs, however, because they can inflict a nasty bite. Pieces of hard crab work well on tautog and sheepshead, and a piece of soft crab is perhaps the most alluring bait anybody can put in the water for inshore species.

Sand fleas, also called mole crabs, are another accessible bait. They burrow as schools in the surf where you can dig them with your hands or with some kind of sieve. Hard or soft fleas are good baits for many surf feeders, but particularly for pompano. Many fishermen put a premium on soft fleas that have just molted, but Ben Doerr likes a hard crab with orange eggs attached. He puts it on the light wire hook and casts it to the outer bar in September and October for the biggest pompano of the year.

Nearly all saltwater anglers enjoy fishing artificial lures, but most of us are realists. For the fisherman who wants action, baits are basic.

A nice cobia *comes alongside after a tough struggle. Like many saltwater gamefish, cobia will strike artificial lures at times, but they are even more likely to be enticed by natural bait.*

Poaching Crackdown, Heavy Mast Crop Credited

Wildlife Officers Arrest 479 For Deer Poaching

Written and Edited by Angela Dorman Hill

Tough enforcement can deter wildlife violations, but when nature becomes an ally the combination apparently is deadly on violators.

Enforcement experts are saying that a bumper crop of acorns last fall combined with a crackdown on poaching in 1987 to reduce the number of 1988 arrests in the state for night deer hunting.

Officers with the N.C. Wildlife Resources Commission arrested 479 persons on charges of hunting deer at night in 1988. That number is down 125 from the 604 arrests made in 1987.

Officers also charged 319 persons with shining light violations. That number dropped from 382 in 1987.

Night deer hunting, commonly known as "firelighting," is described as shining a light into an area populated by deer, and possessing a firearm when shining the light. Shining light or "spotlighting" violations occur in areas of the state where local ordinances prohibit hunters from shining a light on a deer or in populated areas of deer, even without a firearm in their possession.

In 1987, wildlife officers used special operations that netted as many as 44 night deer hunters in one week in target areas where complaints of violations were heavy. Officers from around the state joined their colleagues in Wildlife districts 3 and 5 for Operation Wolfpack, Operation River Rat and Operation Midnight.

"In 1987, we made more arrests because people were hunting deer at night and landowners and sportsmen were reporting the violations while they were in progress," said Col. Harold Ragland, chief of the Commission's Division of Enforcement. "We believe that was a deterrent for 1988 because we covered so much of the state and arrested so many people. Also the heavy acorn crops this past fall kept the deer in the woods and out of the fields so fewer deer were exposed to firelighters."

In 1988, 69 arrests were made for night deer hunting in Wildlife District 1, which includes the northeastern coastal counties. In 1987, 49 arrests were made.

District 2, which includes 12 coastal counties, reported the largest number (114) of arrests of any of the state's nine wildlife districts. This area usually leads the state in firelighting because it has the most dense deer populations and firelighting is prevalent.

In District 3, which includes counties from Wayne to Wake and north to the state line, 25 arrests were reported compared to 109 in 1987. Special operations were conducted in District 3 during the 1987 season.

In District 4, which includes counties from Harnett to New Hanover, 38 arrests were made in 1988 compared to 62 in 1987. Arrests in District 5 were up from 74 to 77 as well as in District 6 where the number jumped from 64 to 73 in 1988.

District 7 saw a decline from 55 to 50 arrests in 1988. Districts 8 and 9 also dropped from 39 to 23 and 41 to 10 respectively.

Officers reported 298 of the arrests made were between 9 p.m. and 3 a.m., while 159 arrests were made between sunset and 9 p.m. Twenty-two arrests were made between 3 a.m. and sunrise.

Conviction rates in North Carolina's district courts are high for night deer hunting. Although most of the 1988 cases are pending trial, more than 200 already have been convicted. Only 25 have been acquitted.

Illegal deer hunting is a misdemeanor and carries a minimum fine of $250. Persons convicted of night deer hunting automatically lose their hunting licenses for two years. In addition, judges may confiscate their firearms, vehicles and any other equipment used while committing the crime. The highest fine imposed on a poacher in 1988 by a judge was $790.

Although six persons were arrested for resisting arrest, only one officer was assaulted. Wildlife officers confiscated 36 deer from firelighters and were involved in 26 high-speed chases.

N.C. WILDLIFE RESOURCES COMMISSION

Blinded targets: *North Carolina deer freeze in their tracks when they are blinded by a spotlight used by poachers to hunt deer illegally at night. Wildlife officers often form teams to track down these poachers.*

Prime Wetlands Habitat

Hunting Creek Swamp Dedicated as MARSH Project

Canada geese and other waterfowl soared over the 136-acre Hunting Creek Swamp in Davie County last winter, assuring the N.C. Wildlife Resources Commission and Ducks Unlimited that their habitat-improvement efforts are already helping the state's waterfowl populations.

On a hill overlooking the swamp near Mocksville, about 50 people from the Wildlife Commission and the North Carolina chapter of Ducks Unlimited braved chilling winds and rain last February to dedicate the area. The tract of land, about one-third wetland, was purchased jointly by the Commission and DU. Ducks Unlimited contributed $67,000 from its Wetlands America MARSH Program. The Commission's share of the total $100,200 purchase price came from proceeds from state waterfowl stamp and print sales.

The Hunting Creek area supports a large population of wood ducks and smaller populations of mallards and black ducks. Wintering migratory waterfowl and resident wood ducks primarily use the swamp. Quail, rabbits, squirrels, deer and other wildlife also use the area.

This is the third joint waterfowl habitat project to be completed by the Commission and Ducks Unlimited under the MARSH (Matching Aid to Restore State's Habitat) Program.

Mackay Island, in the far northeastern corner of North Carolina, was the first MARSH project. It was dedicated nearly two years ago. The Commission, Ducks Unlimited and the U.S. Fish and Wildlife Service spent $23,000 to modernize a dam that controls water levels on the Mackay Island National Wildlife Refuge's middle impoundment. Black ducks, mallards, wood ducks and green-winged teal are benefiting from the upgraded dam.

The second MARSH project was the acquisition of Conine Island, a prime tract of bottomland hardwoods along the Roanoke River.

Under Ducks Unlimited's MARSH Program, the private waterfowl preservation organization returns to states 7½ percent of funds raised by local chapters in that state. The funds returned are used to improve waterfowl habitat in the states.

The Hunting Creek Swamp was selected as a MARSH site after the Southern Piedmont Waterfowlers Club of Mooresville identified it as a prime wetland area for wood ducks. The club is scheduled to put up 12 wood duck boxes on the pond site and help the Wildlife Commission maintain the area as good waterfowl habitat.

ANGELA DORMAN HILL

Western wetlands: *Officials with the N.C. Wildlife Resources Commission and Ducks Unlimited pose on a hill overlooking the 136-acre Hunting Creek Swamp identified as prime wetlands habitat. They dedicated the Davie County area as a DU MARSH project this winter. From left are Charles R. Fullwood, director of the Wildlife Commission; Dennis Sine, chairman of the Davie County chapter of Ducks Unlimited; and Eugene Price, chairman of the Wildlife Commission.*

Guide Lists Agencies, Groups

Conservation Directory Published

The National Wildlife Federation has published its 1989 Conservation Directory, the nation's most comprehensive guide to organizations, agencies and officials involved in natural resource use and management.

The year's 331-page directory includes an extensive listing of federal agencies, national and international organizations, statewide citizens groups, colleges and universities that offer conservation and environmental degrees, wildlife refuges, forests, parks and seashores, and more. Each entry includes an address, telephone number, names of the organization's officers and a description of the organization.

The 1989 Conservation Directory can be ordered by sending your request and your payment to the National Wildlife Federation, 1400 16th St., NW, Washington, D.C. 20036-2266. The cost is $15 per copy plus $3.25 per order for shipping.

Rendezvous Deadline May 15

The registration deadline for the seventh annual Fur, Fish 'N Game Rendezvous is May 15.

The Rendezvous, scheduled for July 9-14 at the Millstone 4-H Camp near Ellerbe, is hailed as a once-in-a-lifetime outdoor learning experience for boys and girls ages 11-15.

Campers study swimming, canoeing, archery, forestry and wildlife conservation, hunter safety, aquatic biology, fishing, wildlife photography, trapping, snake identification, first aid and map and compass use.

The total cost per camper is $100. Registration is limited to campers who have not previattended the Fur, Fish 'N Game Rendezvous. Registration information may be obtained by calling Gary San Julian at (919) 737-2741, or the county 4-H agent nearest you. A toll-free number for 4-H agents is 1-800-662-7301.

The camp is sponsored by the Agricultural Extension Service, the N.C. Wildlife Resources Commission, the N.C. Wildlife Federation, and the National Hunters Association.

Greater Emphasis On Wild Trout

Biologist May Change Trout Program

Fisheries biologists with the N.C. Wildlife Resources Commission are considering a change in their management of trout, one of the state's most popular fish. More emphasis would be placed on wild trout management than stocking from hatcheries, although the Commission would not reduce its trout-stocking operations.

Currently, the Commission's Boating and Inland Fisheries Division manages 2,100 miles of trout streams as "designated public mountain trout waters." The Division manages 400 miles of streams under restrictive regulations as "native mountain trout waters," and the remaining 1,700 miles are managed under more liberal regulations as "general trout waters." Many general trout waters are stocked with fish from the state's coldwater hatcheries at Pisgah Forest and Marion.

The new plan would designate the state's managed trout waters as either "wild trout waters" or "hatchery-supported trout waters." The proposed change in management strategy follows a survey conducted between 1978 and 1981 to inventory trout streams and the species they contain.

"Our wild trout resources are probably greater than any other state's in the Southeast," said Fred Harris, chief of Boating and Inland Fisheries. "It is unique for a state as far south as we are to have wild trout."

North Carolina's trout population consists of three species —brook, brown and rainbow. Trout are coldwater fish and are a major fisheries resource managed by the Wildlife Commission in the mountain region. About 110,000 anglers fish for trout in North Carolina and contribute about $70 million to the state's economy, reports the U.S. Fish and Wildlife Service in their 1985 National Hunting and Fishing Survey.

"We especially want to improve management techniques for brook trout which is a native species of North Carolina," said Harris. "Brown and rainbow were introduced into North Carolina waters many years ago and became established."

Improvements in logging practices have reduced sedimentation in trout waters in the national forests and made them more conducive to natural reproduction.

"But our streams are not fertile enough to support the amount of fishing pressure we have," Harris said. "Trout fishing is very popular, so the stocking of catchable-size trout will remain an important part of our trout-management program.

"Our new management plan will curtail stocking in waters capable of supporting wild trout and concentrate efforts on habitat improvement."

Since the early 1980s, the Commission's trout program has involved stocking more than 1,000 miles of streams and 1,100 acres of lakes and ponds with catchable-size trout. Stockings of brook, brown and rainbow trout have ranged from 550,000 to 750,000 trout annually. In 1988, Commission fish hatcheries produced more than 600,000 catchable trout averaging 9.25 inches in size for stocking in the state's waters.

The Commission is submitting copies of the new plan to conservation groups such as Trout Unlimited and the Wildlife Federation for comments. The Commision welcomes comments from any trout fisherman.

License Costs Less Than Fines

Unlicensed Hunters Pay Bigger Price

Persons who hunt in North Carolina without buying a license may not pay at first, but chances are good they'll pay a bigger price later.

Those who hunt in the state without a license and get caught must pay a minimum amount of $50, which includes a $10 fine and $40 in court costs. This penalty is automatic if the violator waives a court appearance and pleads guilty by mail or before a magistrate. If the case goes to court, a judge may require the violator to pay up to $90 which would include a maximum fine of $50 and $40 in court costs.

A standard state hunting license costs only $15 or a combination hunting and fishing license can be purchased for only $20. A person can buy an annual sportsman's license for $40 which covers most hunting and fishing activities.

During the first segment of the 1988-89 dove season, North Carolina wildlife officers charged 248 people with hunting without a license.

"Every year, we warn people that we'll be out there looking for violators," said Col. Harold Ragland, chief of the N.C. Wildlife Resources Commission's Enforcement Division. "One major thing we check for is to make sure hunters are properly licensed. Thousands of sportsmen in this state buy their licenses because they're law abiding citizens and they want to support and protect the outdoor sports. The license fee is used to improve the habitat and conserve the wildlife resources of this state. But others decide to take the risk of hunting without a license. If we catch them—and we will try—they'll pay more in the end."

May 20-21 Next Stream Watch Clean-up

Volunteers Clean Lumber River

COLIN OSBORNE III

Spring cleaning: *Stream Watch volunteers pull bagfuls of garbage from the Lumber River near Lumberton during a special clean-up weekend. A statewide stream clean-up is scheduled for May 20-21 when North Carolinians will pull together to raise public awareness about the threats facing our inland waters. Local Scout groups, 4-H clubs, civic groups and individuals are encouraged to sign up to clean up local waters during those two days. More information may be obtained by calling Thistle Cone, Stream Watch Coordinator in Raleigh at (919) 733-4064.*

Resident Flock Established

Canada Goose Stocking Program Successful

Though most of North Carolina's wintering Canada geese have packed their bags for their flight north, increasingly some are choosing to stay behind.

After five years of importing geese from northern states to help boost declining populations, biologists with the N.C. Wildlife Resources Commission have successfully established several resident flocks of Canada geese in eastern North Carolina.

Last year, biologists and technicians brought 570 geese from Pennsylvania to five northeastern counties as part of the Wildlife Commission's efforts to restore the state's dwindling Canada goose population. Since 1983, a total of 4,937 geese have been released at 127 sites in rural eastern North Carolina.

The geese were in a molting stage and could not fly when they were brought to North Carolina. Wildlife technicians clipped the birds' regenerating primary flight feathers until the birds had time to adjust to the North Carolina areas.

"As we've monitored the release sites and surrounding areas, we've found that the geese have dispersed and are becoming well established," said Tom Monschein of New Bern, the Commission's waterfowl specialist. "The resident flocks are serving to decoy and hold wintering geese.

"We're now at a point where a sufficient number of suitable release areas have been stocked adequately with geese. Further releases in other locations probably would result in conflicts with other human activities."

Population surveys and gosling production records show that the geese are reproducing well and are on the increase. Information from banding the geese shows that resident birds are being harvested by hunters and are reducing the hunting pressure on geese that migrate to North Carolina.

Biologists will continue to monitor the goose population, now estimated to be between 6,000 and 7,000 birds. They will also conduct ground and aerial surveys; check gosling production; work in conjunction with the U.S. Fish and Wildlife Service to band all goslings; determine the amount of nesting habitat available in the state and monitor conflicts with human activities.

In recent years, waterfowl biologists have fitted Canada geese with neck collars to help monitor their movements and survival in the Atlantic Flyway. The neck collar study is part of a project sponsored by the Atlantic Flyway Council to better manage populations in the flyway by finding ways to increase populations that winter in the South.

Commission Honors Dexter Watts

ANGELA DORMAN HILL

Wildlife scholar: *The life and work of the late Lewis Poindexter Watts Jr., a professor of public law and government, was recognized in January when the N.C. Wildlife Resources Commission adopted a resolution in his memory. Watts joined the Institute of Government in Chapel Hill as a research associate and rose to the position of professor, where he specialized in criminal law and procedure. He became the foremost authority on the subject of fish and wildlife law in North Carolina and provided invaluable service to the Wildlife Commission in his role as legal scholar, advisor and trainer over a period of 30 years. He was a native of Charlotte and graduated from the University of North Carolina Law School with honors in 1957.*

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on February 28, 1989

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	46,402	$15,218,670.68
Lifetime Hunting License	449	117,790.64
Lifetime Fishing License	3,522	727,014.47
Lifetime Subscriptions to Wildlife in N.C.	1,552	205,926.84
Contributions	—	143,865.66
Fund Total		$16,413,268.29
Total Interest Earned	$3,919,855.57	

Field Notes

Season openings, closings and regulation changes:

- Wild turkey season open through May 6.
- Crow season opens June 1 to June 30.

Role In Operation Smoky

Wildlife Officer Commended

North Carolina wildlife officer J.D. "Dan" Moore has been commended by one of the nation's top wildlife enforcement officers for his role in a major undercover bear poaching operation last year.

Operation Smoky, one of the biggest probes ever in North Carolina, netted 43 people involved in a massive black bear poaching and marketing ring from a three-state area. State and federal agents posed as buyers and bought hundreds of bear parts that are sold illegally as medicines in the oriental market.

"Officer Moore was instrumental in getting the covert investigation started with his in-depth knowledge of suspected violators," wrote C.R. Bavin, chief of the U.S. Fish and Wildlife Service's Division of Law Enforcement. "His knowledge of the mountains and the mountain people proved invaluable as the investigation progressed. Dan even became our surveillance crew.

"He learned to operate the video recording equipment with a great deal of expertise and a lot of enthusiasm. Cooperative efforts such as these are essential if we are going to halt the overexploitation of our wildlife resources."

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the book!

"This book . . . is a fitting commemoration of the magazine's 50th anniversary. The book's four sections reflect the emphases seen each month, as the magazine seeks to interest nature lovers and environmentalists as well as the serious hunters and fishermen . . ." —Linda Brinson, Winston-Salem *Journal*

"It is not only for the sportsman in the family but for all the family and an excellent book to send both to Tar Heels who have moved away and to folks who have just moved into North Carolina . . . The only fault I find with *Wildlife in North Carolina* is that it is not long enough."

—Bugs Barringer, Raleigh *News and Observer*

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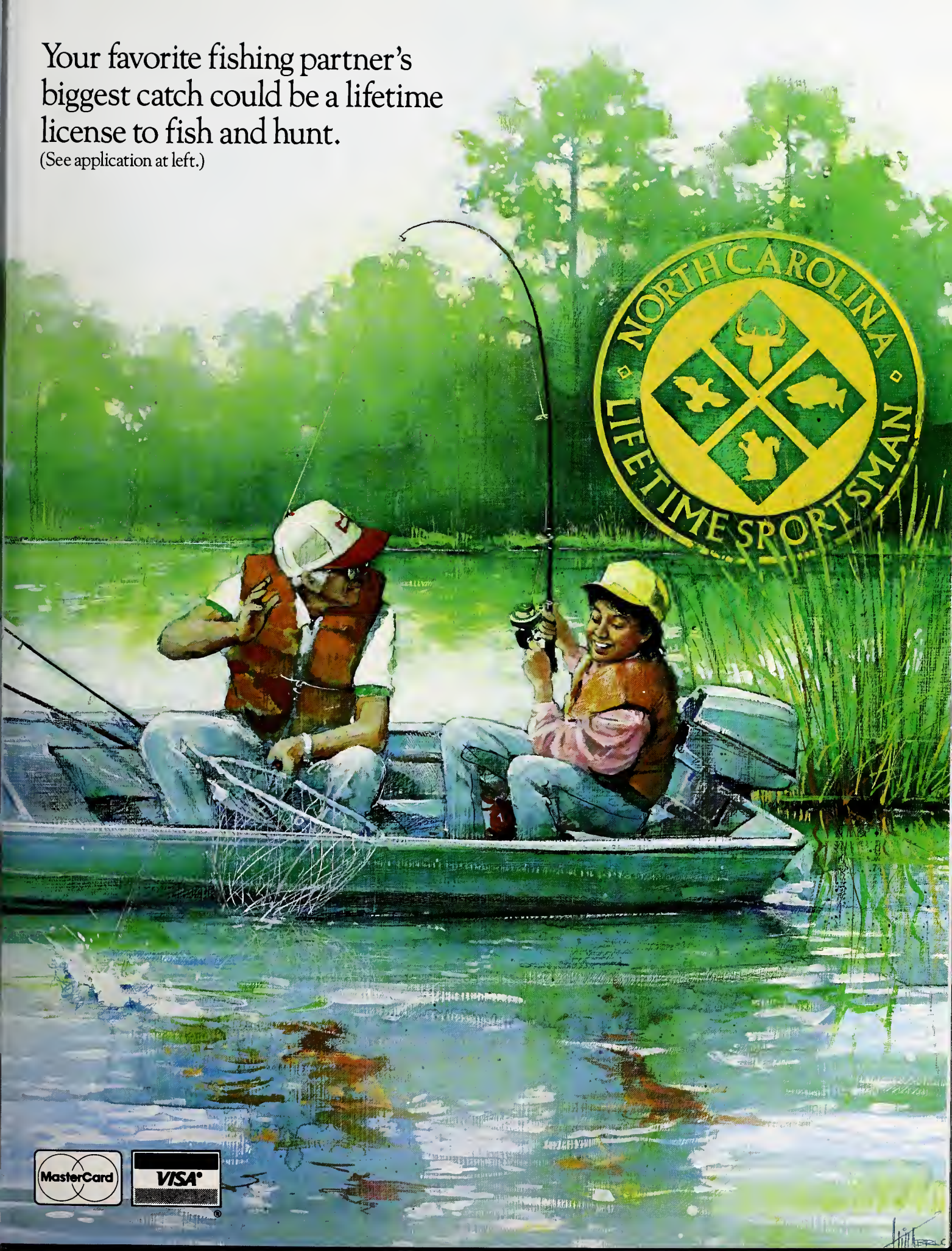

Quail In Spring

The hunting seasons are long over, the kids are growing up, food is plentiful and the cover is thick. Late spring is just about the best of all seasons for the bobwhite quail.

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WILDLIFE IN NORTH CAROLINA

JUNE, 1989 75 CENTS

When Fish Don't Bite

by Jim Dean

There is nothing complicated about fishing. Most fishermen follow a basic three-part operational plan that goes something like this. First, find the fish. That accomplished, select a lure or bait especially designed to reach the fish where you have found them (deep, shallow, whatever). Third, select precisely the enticement the fish most prefer at the very moment it is offered to them. Achieve these goals and success is assured.

JOEL ARRINGTON

Anyone who has fished more than two or three times will surely detect that this plan presumes a great deal. After nearly eight decades of practical angling experience, my grandfather boiled the essence of angling into this sage advice. "You have to give 'em what they want, when they want it," he used to tell me. Realizing that this might be slightly less than helpful, he would often add his personal clincher. "You just have to hold your mouth right."

We've made great advances in angling knowledge and technology in recent years, but there are still many times when we don't catch fish, and don't know why. Finding the fish is certainly easier these days, especially with depthfinders, and there's no shortage of lures designed to fish every conceivable situation. But the more I fish — and I've got 40 years invested in it now — the more convinced I am that there are plenty of times when St. Peter, even with divine guidance, couldn't catch a sardine.

Naturally, I have a theory (all fishermen do). I believe that there are substantial periods of time when fish simply do not eat anything, and they undertake these hunger strikes in puzzling unison. No snacks. No nibbles. No sudden impulses to raid the refrigerator. This is totally foreign to humans because there are few times in our lives when we — regardless how stuffed we are — will not eat at least one more potato chip or one more sliver of brown sugar pie. For example, the right color M & M, properly presented, will be unhesitatingly scarfed even if we have just consumed a 16-inch pizza with all the trimmings. There are no exceptions. Why are fish so different?

Last fall, I spent the better part of a week fishing on an ocean pier. Conditions were perfect for Spanish mackerel, and indeed, the water was full of them. We plugged until our arms were weak. We jigged gold hooks (the flash attracts strikes). We caught small live baits and free-floated them on the lightest possible leaders, even hiding our No. 6 single hooks behind the gills of the minnows so the Spanish couldn't see them. You'd think at least one or two of those mackerel would have had a hankering. But Nooo. All day, every day, the mackerel merely lolled in the water, ignoring not only our offerings, but all the natural food around them. It was particularly frustrating because we could see the fish. On the fourth day, under the same weather conditions, the Spanish went nuts, eating everything but the barnacles off the pilings.

In large inland lakes, we usually assign a failure to catch fish to an inability to locate them (even with depthfinders, you don't always find fish). But in smaller bodies of water, locating fish is seldom the problem. On a small farm pond known to have a good fish population, it is possible to cover virtually every inch of water with a wide variety of lures and baits, yet it is not unusual to go home fishless. Even then, we're inclined to blame our choice of lure or bait. It seems incredible to us that every single fish might go for days with lips zipped tighter than Dick's hatband.

When fish decide to eat, they seem to do so simultaneously. Most of us have had the occasional experience of being at the right place at the right time. Just recently, I was fishing a trout stream with some friends, and though we had scattered over several miles of water to fish, we all had the same experience. For the first two hours, we caught nothing. Then, at approximately the same time, we all began to catch trout hand over fist. Naturally, we each took credit for figuring out what to do, but it was clear later that we had simply been there when the trout decided to feed. In fact, we were all using different flies. How did those trout arrive at their mutual hunger at about the same time throughout several miles of water?

If hunger in fish is touched off simultaneously by barometric pressure, biorhythms, moon phases, holding your mouth right, or something equally arcane, it's not obvious enough to be reliable. And with 33 million fishermen trying all the combinations, you'd think we'd have a better handle on it than we do.

Finally, there are angling phenomena that defy all analysis. The current world record brown trout was caught on a combination of Jolly Green Giant niblets and marshmallows. Pray tell, what did that wise old brown think he was eating? Then there's the kid I know who was at a church picnic and caught a 3-pound shellcracker on a piece of hotdog. And what about the guy several years ago who was catching striped bass in the Hatteras surf while everyone else was going fishless? His lure was a peeled carrot strung on a wire leader above a treble hook.

What's going on here? Does this mean I'd be just as well off fishing for largemouth bass with brussel sprouts? Some days I wonder.

June, 1989
Volume 53, Number 6

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *An ocellated moray eel peers out of its crevice in a display at one of North Carolina's three aquariums. Photograph by Ken Taylor.*

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Black Rail	Yellow Rail	Sora (migrant)	Virginia Rail
5 – 6 inches	6 – 8 inches	8 – 10 inches	8 – 11 inches
Brackish marsh	*Freshwater marsh*	*Freshwater marsh*	*Freshwater, brackish*

Marsh Big Mouth

written by Lawrence S. Earley / illustrated by David Williams

__The clapper rail__ is superbly adapted to its salt marsh habitat. It's surrounded by food — fiddler crabs, most commonly, as well as grass-climbing periwinkles. The thick-stemmed spartina *grass provides cover for the marsh bird and the spongy mud deters most predators, although fish crows and raccoons occasionally are successful.*

The salt marsh is a wonderfully sensuous place on a summer day, full of bright colors, exhaling earthy odors, and clamorous with marsh music: *Cak-cak-cak-cak-cak. Kik-kik-kik-kik-kik. Bup-bup-bup-bup-bup. Rack-k-k-rack-k-k.* A fair number of these strange noises originate from a single marsh inhabitant which is capable of "a remarkable variety of clacks, grunts, groans and shrieks," as one biologist has put it. The scientific name of this creature is *Rallus longirostris crepitans*, or "long-billed clattering rail," an apt way of describing the clapper rail.

Rails are members of the Gruiformes, an order of birds that includes cranes and limpkins, rare species in North Carolina. Clappers are quite common but you wouldn't know it, as secretive as they are. One writer claims it is the most secretive bird among all 800 of North America's bird species. Chances are you'll hear the clapper rail long before you'll see it, but if you spend a little time in a salt marsh, especially at low tide, you'll see one soon enough.

Look there! See that little grayish, henlike bird darting from the marsh grass? Stay perfectly still and you'll see it wandering the grass borders and dashing along the mud flats hunting for its favorite food, fiddler crabs. Often the rail grabs a fiddler crab right out of the top of its burrow, shakes it to remove the big claw and then pops it down its gullet. The rail will also eat snails, grasshoppers, spiders, clams and periwinkles.

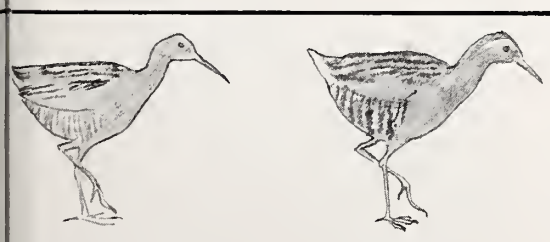
If you make a move, the rail evaporates, swallowed up by its spartina grass habitat. The rail is superbly adapted to the world of the salt marsh, slipping easily by the thick stems of grass — the expression "thin as a rail" applies to this bird about as as readily as it fits a fence rail. This is one bird that seems to prefer walking to flying. Indeed, its legs are very well developed while its wings are stubby and ill-fitted for aerial pursuits. It's got to be hard-pressed before it will flutter awkwardly into the air, although once airborne, it's a deceptively swift flier.

It may be surprising, then, to find out that the clapper rail, like several other rails, migrates hundreds of miles each spring and fall. Some disbelieving wags swear that they've seen hundreds of the rails wearing tiny backpacks hiking alongside I-95 in October, but the truth is they fly and they fly by night. New England's wintering rails will stop in North Carolina, although most will continue on to Florida. Our nesting summer birds will also migrate to Florida or Georgia, returning in March or April, often to the same nesting site.

The clapper rail is the only true saltwater species among North Carolina's rails, the others frequenting either freshwater or brackish water marshes. The sora and yellow rail are migrants only and don't breed here. Some biologists consider the king and the clapper rails to be salt and freshwater forms of the same species. The two are hard to distinguish, a task that's made harder, during migration, by the king's habit of visiting salt marshes and the clapper's arrival in a freshwater marsh.

Stop at a salt marsh this summer, on your way to the beach, and spend awhile. If you can get onto an old dock that extends over the marsh grass to a creek channel, all the better. The marsh can be a lively and boisterous place, especially when the big-mouthed clapper rail is at work.

__Of North Carolina's__ six rail species, the king rail is largest and the black rail the smallest. The yellow rail is probably the rarest of the six in North Carolina. Only the clapper, the king, the Virginia and the black rails breed here.



Clapper Rail
12 – 16 inches
Salt marsh

King Rail
15 – 19 inches
Freshwater marsh

LAWRENCE S. EARLEY

The Lore Of LIVE OAKS

For centuries humans have gloried in the beauty of the live oak, sat in its shade, and used its sturdy wood. Today the destruction of the maritime forest imperils the future of this magnificent giant.

by Lawrence S. Earley

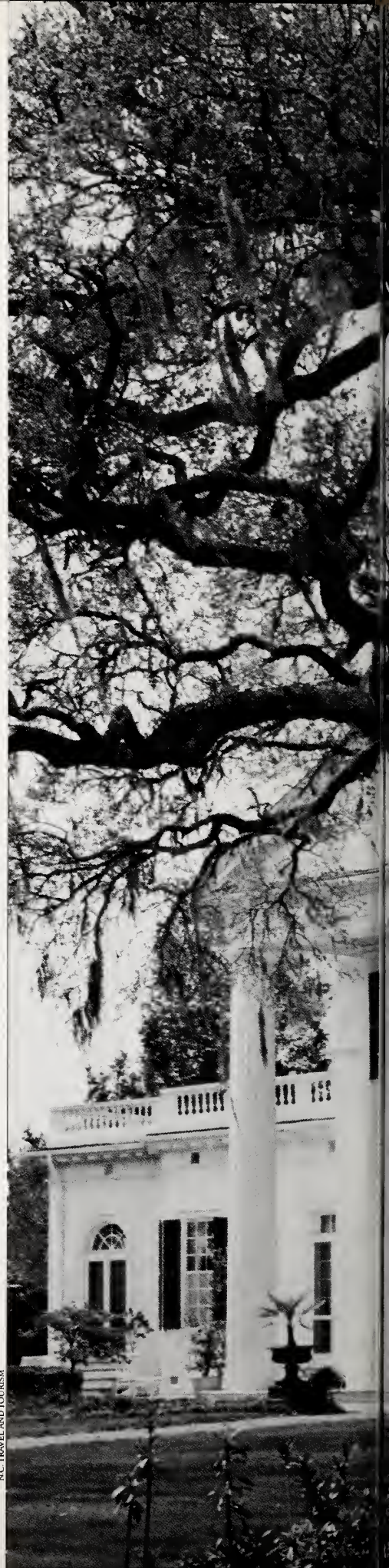
In an enigmatic phrase, 19th-century Georgia poet Sidney Lanier once wrote of the "gospelling glooms" of live oak trees. Perhaps he was referring to the deep shade cast by a full-grown specimen, the cathedral-like effect that overwhelms anyone who walks beneath the wide-spread expanse of this lovely tree. Then again, the phrase may have come out of a sudden clairvoyance, a premonition of the live oak's future fate.

The live oak's present status in North Carolina and the Southeast is gloomy indeed — perhaps even "gospelling gloomy." As the maritime forest goes, so goes the live oak, its dominant tree, and today the maritime forest is dying the death of a thousand cuts. (See "Our Dwindling Maritime Forests," July 1985.) Each year more slivers of the forest disappear to make way for new condominiums, shopping centers, roads and second homes. It's possible that within our lifetime the last of the natural habitat of the live oak may utterly disappear.

These are gloomy thoughts to hang on a tree that occupies such a large place in the natural heritage of North Carolina, a tree so beautiful and, once upon a time, so useful.

To inventory the history — both natural and cultural — of the live oak (*Quercus virginiana*) is to begin with its portly shape.

Southern plantations *and ornamental live oaks have traditionally gone hand in hand. Orton Plantation near Wilmington (above and right) is only one of scores of southern plantations where live oaks were planted to shade the house and the long entrance drive.*



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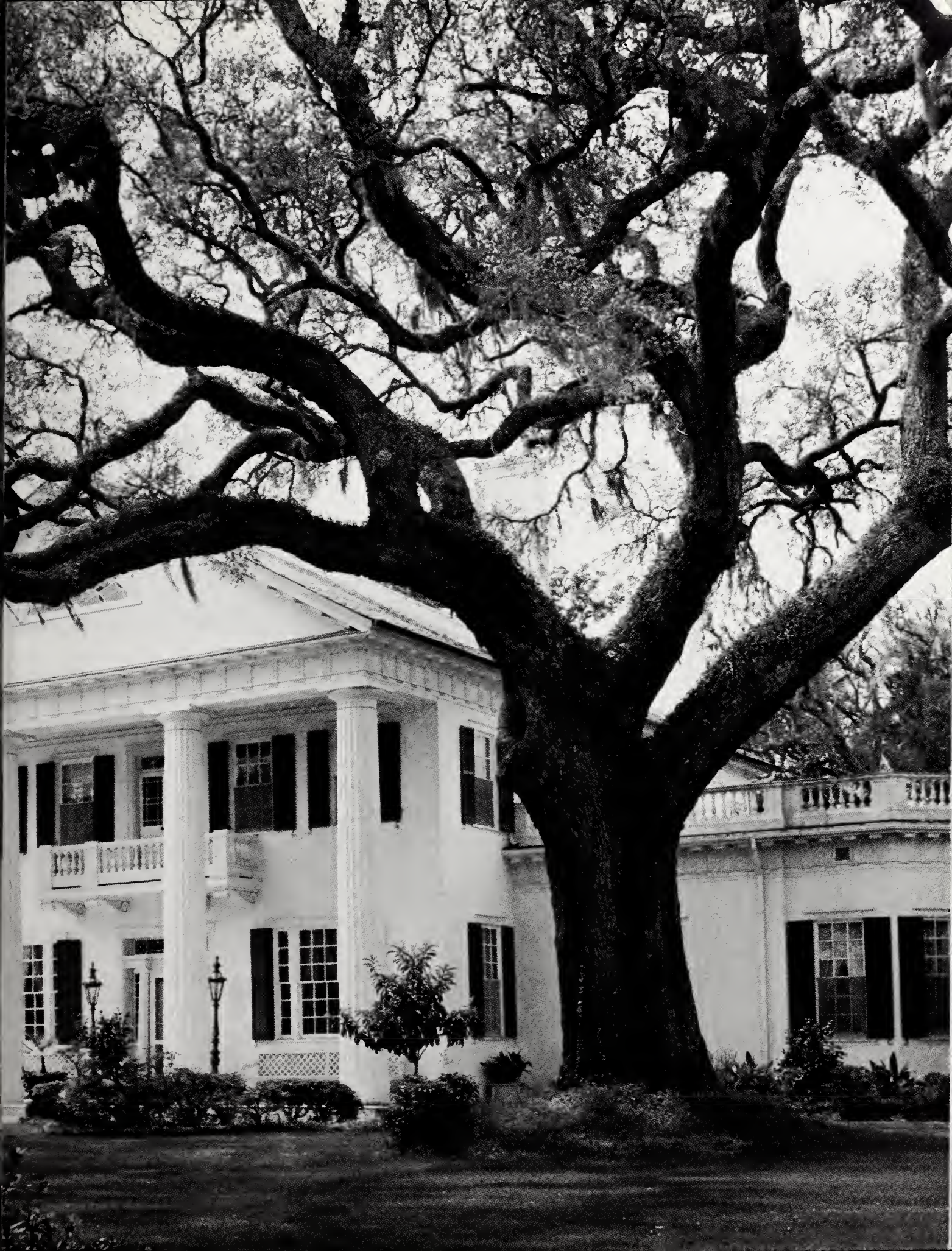


The Lore Of LIVE OAKS

It's not a very tall tree — 50 feet is about its maximum height and most of the time it grows much shorter. Instead of growing vertically, it seems to channel most of its development sideways. Its massive trunk averages 3 to 4 feet in diameter, but there are specimens that have achieved more impressive girths — one Louisiana live oak trunk measured 32 feet in circumference. But look at its lovely, dome-shaped crown and there you have the secret to its appeal. A live oak tree covers more than an acre of real estate as numerous branches spread over an area as much as 160 feet wide, or three times its average height. Some branches are so long and heavy that they actually grow into the ground. A few trees could shade an entire baseball field.

One of the best places to see domesticated live oaks at their loveliest is the old Cape Fear River town of Southport. Not far from Bald Head Island and Frying Pan Shoals, Southport has been nestled within a live oak forest whose branches interknit above the streets and sidewalks. On a warm March afternoon, visitors found the effect like walking through colonnades of shade. There are no giant trees here, although in the Kaziah Memorial Park there is a large and ancient-looking live oak known as the "Indian Oak" whose gnarled trunk has turned parallel to the ground, rooting twice. The small, oval-shaped leaves were brown in March, and snapped off easily. Live oaks are evergreen through the winter, but they drop their leaves every 13 months. A curious feature of the live oak is the way it hosts a variety of epiphytes (airplants) and parasitic plants. Gardens of resurrection fern sprouted from the joints of major branches. Crusty, greenish lichens covered the upper branches. And for the romantic, silver-gray festoons of Spanish moss hung from the trees' heavy limbs.

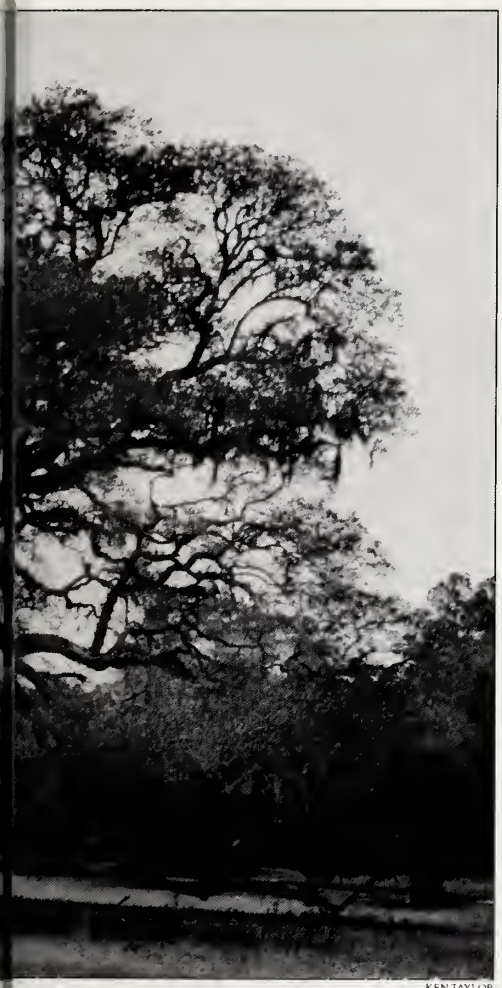
The natural range of live oak is a narrow belt along the southeastern coast from Virginia to Texas. The tree will grow in rich soils along the edges of coastal rivers and swamps, yet it also flourishes in the maritime forest ecosystem, a hardy forest that grows on sandy dunes flanking the ocean. It's an environment where wind and salt spray can prune some live oaks to the size of footstools.

Faced with these challenging conditions, a live oaks' squat shape is advantageous. So are its thick and leathery leaves that can shrug off salt-laden breezes that would kill most other trees. Live oaks provide the protective canopy for many other hardwood trees and plants below that do not tolerate these conditions. In the heart of this forest, Indians once hunted deer, wild turkey, squirrel and other game that feasted on the large and sweet acorns that fell from the live oaks. Buffeted by hurricanes and frequent coastal storms, the forest grows into what looks like a large and impenetrable hedge, its canopy smoothed and rounded.

One reason the live oak can withstand such punishment is that it is the heaviest of all oaks, weighing up to 59 pounds a cubic foot. Even one of its main branches could weigh somewhere in the tons. It was precisely the strength of the tree that attracted colonial shipwrights who quickly discovered

LAWRENCE S. EARLEY

The squat trunk, *broad crown and pleasing shape are unmistakable characteristics of the live oak (above). Some live oaks can spread their branches 160 feet wide. Live oak hosts several different species of epiphytes, including resurrection fern and Spanish moss. A lusty growth of resurrection fern greens out after a rainstorm (left).*



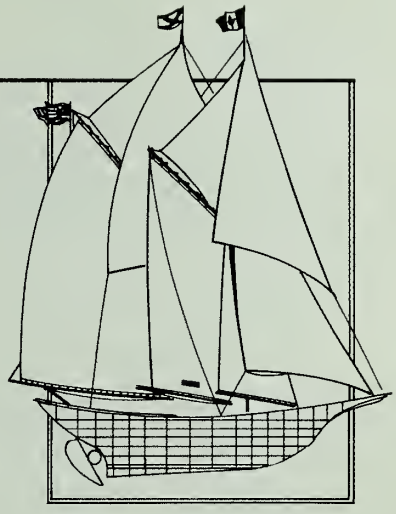
KEN TAYLOR

that as a structural timber for the hulls of wooden ships, live oak was unexcelled.

Southern shipwrights were no doubt the first to use the wood for their merchant craft, but the use of live oak on sailing vessels quickened after the Revolutionary War. Humiliated by Barbary pirates in the Mediterranean who preyed with impunity on American ships, the United States decided to build a modern navy to protect its merchant fleet. Congress ordered six frigates to be constructed, among them the *Constitution*, "Old Ironsides." Experienced sea captains recommended live oak for the new ships, saying that the use "of the most durable wood in the world (live oak) would be a great saving to the United States, as we are well satisfied... that [the ships'] frames will be perfectly sound a half century hence..." Live oak was specified for the frames of the new ships.

In her fascinating book, *Live Oaking: Southern Timber for Tall Ships* (Northeastern University Press, 1981), Elizabeth Wood recounts how in the ensuing years the wood from giant live oak trees was wrenched from the coastal forests of Georgia and shipped to Philadelphia, New York and other seaports where the ships would be made. The durability of these ships' frames was demon-

Live Oak For A Wooden Ship



Shipbuilders north and south craved the strong and naturally curved wood of the live oak tree for their wooden craft. As many as a thousand pieces of live oak, in different shapes, were needed for a 19th-century warship. To trained eyes, a single tree revealed dozens of useful timber shapes (figure 2) and carpenters, using patterns, hued the pieces out of the wood almost like sculptors. Especially prized were long curved pieces for making the frame of a wooden ship, and stubby "knees" to support the ship's lower framework (see light areas in figure 1).

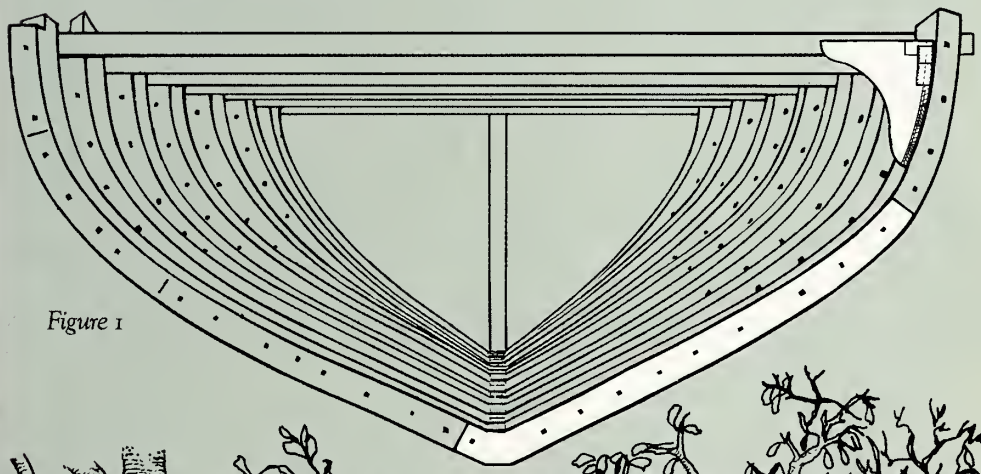


Figure 1

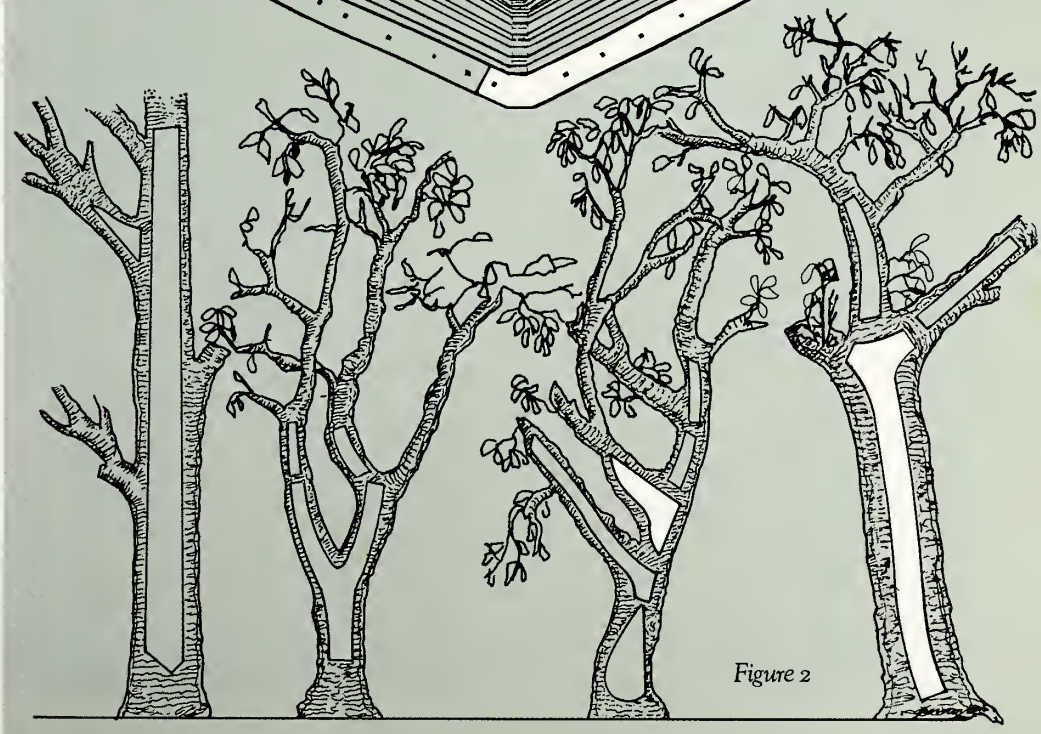


Figure 2

The Lore Of LIVE OAKS

strated during the War of 1812 when an American salt, witnessing shot bouncing off the *Constitution's* hull, shouted, "Huzza! Her sides are made of iron!" The reputation of "Old Ironsides," thus, depended greatly on Southern live oak.

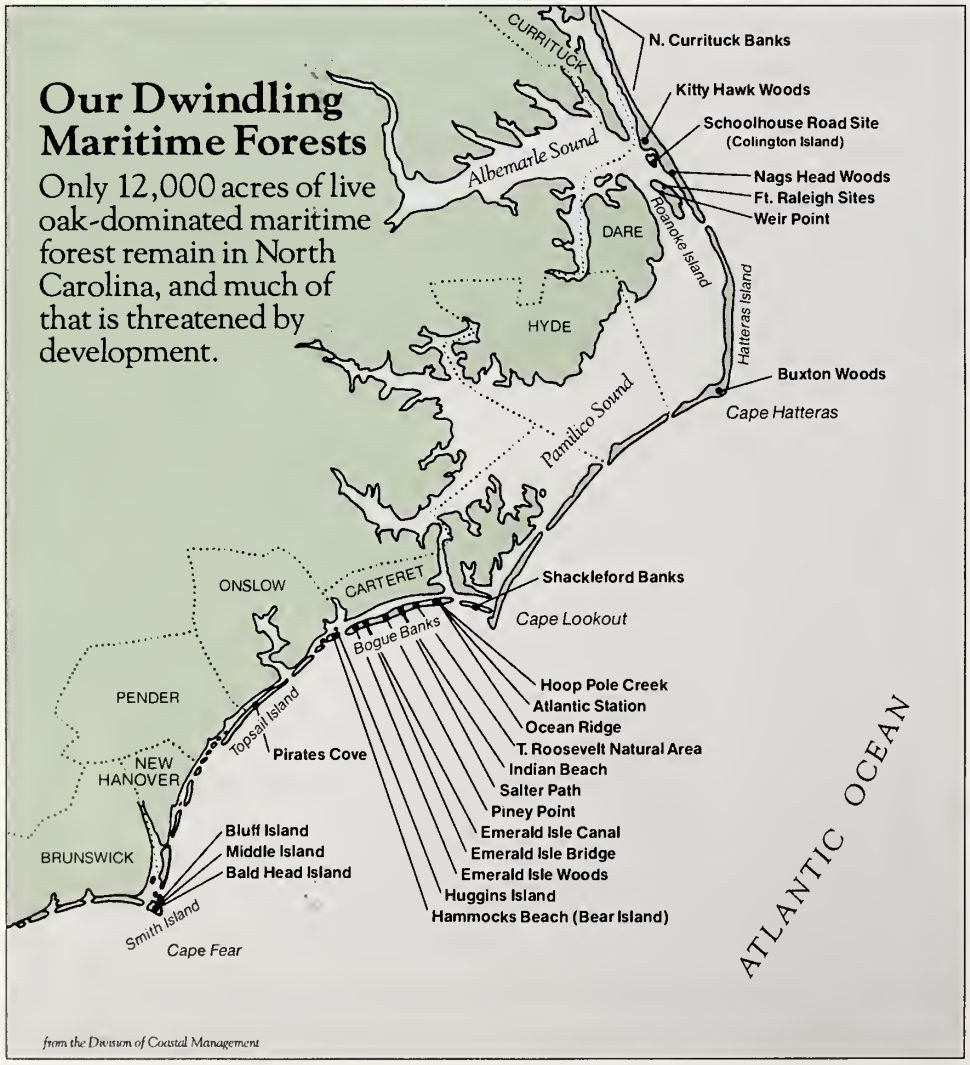
"Oak mania" set in after the War of 1812 as gangs of New England "live oakers" roamed the coast from the Carolinas to Louisiana, looking for forests of uncut trees. A ship of the line, or a merchant ship of the day, required an enormous amount of wood of many types. Contracts stipulated exactly what kind of wood would be used for specific parts of the ship. In a typical contract, dated May 8, 1844 and now residing in the North Carolina State Archives, William Dunn of New Bern contracted with three builders to construct a merchant ship 72 feet long and 24 feet in the beam. "The keel, wails [wales], keelson and quick work to be of best white oak, her frames to be of Live oak and red Cedar, (seasoned) her Stern post, Stern, Lining and Transom to be of Live oak. Stanchions, of Locust or Red Cedar. Bottom plank to be of the best quality of Pitch pine two and a half inches thick, Bullwarks to be of Pitch pine. Rails of White oak. Ceiling of pitch pine two inches thick. Deck plank of Pitch or Yellow pine three inches by five."

With such contracts in hand, live-oaking expeditions were organized. To many, live oaking became a career. Men could spend years — sometimes decades — working in the live-oak fields of the South. It could be a hellish life. After arrangements were made with property owners, the men would build roads from the landings to the oak fields which often grew on distant ridges that flanked malarial swamps and rivers. On one expedition whose records have survived, five shipwrights died of malaria. On another, 47 men died of yellow fever.

Cutting live oak was like trying to cut stone with a knife. Axes would dull more quickly and need sharpening more frequently than in other kinds of logging. Teams of oxen would have to be rounded up to pull the heavy wood out. And then often the whole process would have to be repeated at many other sites because there weren't enough trees to fill the order or the trees were ruined by heart rot. A ballad of the period gives a flavor of the stern life of a live oaker:

Pounding live oak is nothing like fun,
Especially the dry ones will make the sweat run;
It will make your axes glitter and smoke,
You'll need iron handles to pound this live oak.
Derry down, down, down, derry down.

They were not merely loggers, the men who went live oaking. Most often they were shipwrights who used their knowledge of shipbuilding to judge a tree's potential for producing ship timber and for hewing



CURTIS WOOTEN

***Live oaks** frame a Harker's Island shrimp boat as a storm brews above Core Sound. The picturesque trees play an important role in the maritime forest, the barrier islands' first line of defense.*

LAWRENCE S. EARLEY

***Live oak** branches draped by Spanish moss provide a symphony of motion as they are tossed by coastal breezes. In the original maritime forest, live oak acorns were a feast for wild turkeys, deer and other wildlife.*

The Lore Of LIVE OAKS

pieces in the correct shape. As many as 60 shipwrights and 40 carpenters might be required. The ship's designers would outfit them with a variety of "moulds" or patterns to guide them in selecting trees to be felled and trimmed. Much as today's seamstresses cut fabric by tracing a pattern with their scissors, live oakers would lay the moulds—thin wooden battens a half- or quarter-inch wide—on top of the crooked branches and then trim them with axes to produce the shapes needed (see illustration). The pieces that were most prized were the joints of a tree, where the roots joined the trunk in a natural curve, or a branch sprung from the trunk. A ship would require hundreds of these pieces—as many as a thousand pieces of live oak went into a warship of the day.

North Carolina's live oaks were just about exhausted well before the Civil War. In some places, they've never grown back. Live oak and red cedar forests once covered Ocracoke and on Hatteras Island a section of beach is still called "The Great Woods," 100 years after the last tree was removed. Oak mania led to repeated and successful thefts of trees on United States property. No attempts to protect the forests were ever successful. So concerned was the government over the loss of live oaks, that by mid-19th century it had set aside nearly a quarter million acres for a forest preserve, the first tree in America to have merited this attention.

Live oak was put out to pasture, at least symbolically, after the indeterminate Civil War battle between the armor-plated *Monitor* and *Merrimac*. Iron and steel would now be the materials for future ships. In the 20th century the tree found few other applications as woodworkers found the wood too hard to use in cabinetry.

Of course, the tree had already found an important place in the South as an ornamental. Impressed by its size and beauty, plantation owners had planted saplings along the imposing entrance drives of antebellum mansions. Live oak hung with Spanish moss soon became an important part of the visual symbolism of the Old South. Hollywood still uses it today. It's likely that foreigners who have never visited the South know the live oak from its familiar association with movies such as "Gone with the Wind."

So romantic had the live oak become, that in the 1930s The Live Oak Society was formed in Louisiana with a membership re-

LAWRENCE S. EARLEY

SCOTT TAYLOR

***Live oak's** strong wood and leathery leaves protect it from coastal storms and the constant salt-laden breezes. Dominating the maritime forest, the tree provides cover in the interior for trees and plants that cannot resist salt (above). According to legend, Southport's massive Indian Oak (left) served the Indians as a landmark.*

LAWRENCE S. EARLEY

***The maritime** forest once covered the Outer Banks, but development has destroyed thousands of acres. Condominium developments and roads open holes in the maritime forest, exposing the interior to salt poisoning.*

stricted to century-old live oaks of impressive girth and spread. The officers in the club were live oaks. The society still exists today.

The live oak has been described as a tree of great longevity. Middleton Plantation, outside Charleston, South Carolina, is reported to have a thousand-year-old tree. The twice-rooted live oak in Southport's Kaziah Memorial Park is claimed to be 800 years old. Yet talk of the great longevity of live oak is somewhat suspect. The tree gives false growth rings and so the usual dendrochronological methods of aging a tree are unreliable. According to Professor Thomas Perry, a former forestry professor at N.C. State University who has taken a special interest in live oaks, most older live oaks are probably no more than 200 to 300 years old. Perry says that live oaks are extremely fast growing, especially on rich soils, and thus size is no indication of age.

"When you see a huge live oak," he says, "there's no need to assume it's 200 or 300 years old. I've seen a live oak planted in New Orleans in 1922 with a 56-inch dbh (diameter at breast height)."

The tree is not sensitive to most plant pathogens, but large live oaks in the deep South last year reportedly fell victim to a fungus known as *Endothia parasitica*, also known as the chestnut blight. This pathogen wiped out the chestnut tree earlier in the century, but foresters today do not think that it endangers North Carolina's live oak trees.

What threatens the live oak is the loss of the maritime forest upon which the tree depends. A recent report by the state's Division of Coastal Management found that the maritime forest ecosystem was virtually gone in North Carolina. An estimated 12,000 acres remain, much of that in imminent danger, according to the authors of the report, Michael J. Lopazanski and Jonathan P. Evans of the Duke University Marine Laboratory in Beaufort, and Richard E. Shaw of the Division of Coastal Management. "What remain are a series of isolated tracts that are being encroached upon yearly by an ever increasing tide of coastal development," they wrote. "The continued existence of the maritime forest ecosystem in North Carolina . . . is in question . . . ."

In a telephone interview, Dr. Evans noted that the rate of maritime forest destruction in many areas along the coast is astonishing. "On Bogue Banks, for example, we believe that all the forests that are not presently under some form of protection, like the Theodore Roosevelt Natural Area, will be gone in the next five to 10 years," he said. "No matter where you look on the coast, where forests are in private ownership there's a high likelihood that that forest stand will be gone within the next 10 years."

Despite these predictions, Evans says he's optimistic that the Coastal Resources Commission will vote this spring to list the remaining maritime forests as areas of environmental concern, which would entitle them to protection under the state's Coastal Area Management Act. "If we adhere to these rules," Evans says, "it'll slow development down enough so that perhaps a new level of awareness can be brought about among private owners of maritime forest. It will also give us time to acquire important tracts of forest."

Like the longleaf pine and Atlantic white cedar, the live oak is a distinguished player in the history of our Coastal Plain. Unlike them, perhaps, the live oak is imperiled today because its habitat has risen in value. Once occupying the loneliest and harshest stretch of our coastal landscape, the maritime forest is surrendering daily to the insatiable appetities of human sea-seekers. That appetite threatens to crowd out a tree that has meant a lot not only to North Carolina, but to the nation. Remember "Old Ironsides." ◻

A pretty parasite, *the cuckoo wasp gets its name from a habit it shares with the long-billed cuckoo which lays its eggs in the nests of other birds. The cuckoo wasp lays its eggs in the cells of mud daubers and potter wasps.*

MORE THAN JUST A STINGER

Many centuries ago, travelers returning from the far corners of the earth told strange and absurd tales of outlandish forms of life they had encountered on their journeys. They reported savage 3-foot-long grasshoppers with saw-like teeth; wolf-sized ants; and giant hornets that carried off children. Though we have long ago discredited these exaggerated accounts, almost every day I see creatures that are, in their own way, almost as remarkable.

Nowhere among the earth's creatures do we find more amazing forms of life than in the wonder world of insects, and especially among our social and solitary wasps. The term "wasp" covers a wide expanse, encompassing a large and diverse number of species in the most advanced order of insects, the *hymenoptera*, which also includes the ants and bees. Wasps are broadly classified as either social or solitary. In the social group, incorporating the hornets, yellow jackets and *polistes*, or paper wasps, great numbers of individuals live in organized communities with each population usually having a single egg-laying queen and many female workers. The solitary type includes the hunting or digger wasps, the mud daubers, the cicada killer, the potter wasp, and the parasitic ichneumon wasps. In most species, the female, working alone and unassisted, cares for the young.

One of the most common of our social wasps is the bald-faced hornet (*Vespula maculata*). In early spring, at about the time bloodroots and violets are blooming in the naked woods, the queen emerges from hibernation and from bits of weathered wood chewed into pulp, she shapes and fashions a few hexagonal cells. Then she lays an egg in each of them. When the first adult workers are born, they take over the labor of caring for the young, enlarging the nest, and defending it against intruders with fiery stings. The young are fed on insects of various kinds chewed into a pulp. By midsummer the colony has expanded into a teeming insect city of several hundred inhabitants, all sexually immature female workers. Then, late in the year, a crop of males and new virgin queens are produced that fly away from the nest and mate. The males soon die, but the now-fertile young queens find suitable cavities in rotting logs where they spend the winter in the deathlike sleep of hibernation, carrying whole future populations within their bodies. It is by instinct alone that these young queens can foresee the long night of winter approaching and the morning of spring lying beyond.

As the autumn chill deepens, the old queen and all the hundreds of workers are killed by the cold, and the once-prosperous city is deserted and empty. As in a thousand other examples, here we see the sacrifice of the individual for the good of the race. Having no further use for them, nature, it seems, draws a sword and slays them.

The little yellow-jackets usually build their paper nests in the ground; otherwise their habits are quite similar to those of their larger black-and-white cousins, the hornets. Though smaller than other social wasps, they make up for what they lack in size by their fiery tempers and the ferocity of their stings. At the slightest provocation, they storm into battle, to do or to die.

The nests of paper wasps — single naked combs of brood cells — are familiar sights under the eaves of houses, barns and garages. In contrast to the others, they are relatively nonaggressive and seldom sting unless seriously provoked. Each population reaches a climax about midsummer and

***The bald-faced** hornet is more than just a pretty face. The queen of the species chews weathered wood to make her hexagonal brood cells, then lays an egg in each cell.*

Wasps pack a wallop, as most anyone can attest, but the hunting techniques of these insects are often astonishing.

written and photographed by Harry Ellis

(1) *Bald-faced hornet queen*

(4) *Young potter wasps*

(2) *Mud dauber cells*

Hunters & Homemakers . . .

. . . are shown here in a waspish profusion. Social wasps live in organized communities where the queen produces all the young (1, 6). Solitary wasps work alone. Among them, pipe organ mud dauber wasps build long cells of mud in which the female places paralyzed orb-weaver spiders for her developing grub (2, 3). Potter wasps build little clay "jugs" and stock them with caterpillars (5). When the young wasp becomes a winged adult, it cuts a hole in the jug to emerge (4). The largest hunting wasp is the cicada killer which provisions her burrow with paralyzed cicadas (7). The digger wasp hunts for live grasshoppers for her young (8).

(5) *Potter wasp pupa*

(6) *Paper wasp larvae*

(3) *Mud dauber tubes*

(8) *Golden digger wasp*

(7) *Cicada-killer*

MORE THAN JUST A STINGER

then begins to decline, but well into autumn the workers continue to huddle around the nest as if reluctant to leave the old homestead. Like the hornets, only the new queens survive the winter to carry the species through the coming year.

It is among the solitary hunting wasps that we find the cleverest and most resourceful of all insects, and also the most dramatic examples of instinct in action. There are hundreds of different species of these wasps, each specializing in the capture of a certain kind of insect. Some hunt only spiders, others caterpillars, and still others grasshoppers or some other specific type of insect. Only the very young are carnivorous; the adults dine on a delectable fare of nectar and sap.

Almost everyone who has climbed up into a hayloft or farmhouse attic, or spent time around old weathered buildings, has noticed rows of long mud or clay tubes placed side by side like the pipes of an organ. These are the nest cells of the pipe organ mud dauber wasp (*Trypoxylon politum*). The female begins the construction by gathering mud pellets at a nearby marsh or brookside, carrying them to the nest site and skillfully molding and shaping them into the neat little mud tubes that will be nursery chambers for her future young. When the work is finished, she goes spider hunting, searching until the desired variety is found — usually a brightly patterned orb weaver. Stinging it in the nerve centers so as to induce a complete and lasting paralysis, she carries it to the nest. Stuffing it into the top of the cell, she then goes back for more spiders. When the chamber is well stocked, an egg is laid on one of the spiders and the cell partitioned off with a wall of mud; then she begins laying up provisions in the remaining cells and depositing eggs in them.

In three days or so the egg hatches into a tiny squirming grub that, in the darkness, begins ravenously devouring the helpless spiders, one after another, and growing rapidly. After passing through the pupal stage, it chews its way out of the tube and is soon off in flight.

The largest and most spectacular of our hunting wasps is the giant black-and-yellow cicada killer (*Sphecius speciosus*). In the sweltering heat of some August afternoon, you may be listening to the monotonous, whirring "song" of the dog day or annual cicada. Abruptly its dirge ends in a distressful screech. You can be sure that one of these great huntresses has found her victim. When the capture is made, her dagger-like, venom-loaded stinger is thrust precisely into the nerve ganglia that will bring about instant paralysis, but not death, to the victim. Even if she carried within her brain a complex map of cicada anatomy, she couldn't have placed the sting any more exactly.

After transporting the cicada back to her previously prepared burrow, she drags it down into the nursery chamber, lays an egg upon it, and seals the entrance. In a few days the egg hatches and the larva begins feeding on the comatose, but still-living, cicada. If she had killed it instead, the youngster would have found a crumbling mass of decaying flesh, inedible and worthless. In some mysterious way that not even the wisest among us understand, the larva itself "knows" just what parts of the cicada's body it must eat first in order to let it live a few days longer and thereby prolong its own supply of fresh food. Always those parts not essential to life are eaten first, leaving the vital life-sustaining organs until last.

While the larva continues to feed and grow, the cicada eventually dies. Now with no more food left, the larva makes itself a cocoon and enters the pupal stage of its life. In the blackness of its chamber, it remains dormant during the cold months. But one day, in the warmth of the new spring, an "alarm" sounds and out of the sarcophagus comes a

***Paper wasps** build their familiar communities under house eaves and other wooden structures. These social wasps tend the young which develop in brood cells.*

A deadly driller, *the giant ichneumon wasp (right) somehow locates wood-boring grubs which have tunneled deep within the wood of decaying logs (bottom). The wasp's long ovipositor (black) works like a drill to reach the grub that may lie 3 inches deep. An egg is laid and the hatched larva will feed on the grub.*

great black-and-yellow wasp that pushes its way upward into the light.

Almost daily during the summer, throughout the fields, and along garden paths and city sidewalks, I come across shiny-black female thread-waisted wasps (*Ammophila*) and their burrows. Her habits are similar to others of her kind, with a few notable exceptions. Up until recently it was assumed that after the nest chambers had been provisioned with paralyzed caterpillars, an egg laid, and the burrow sealed, the wasp went merrily on her way and that was the end of it. But now we know that with what looks like remarkable parental concern and foresight, she returns at intervals and opens up the burrow to check on her developing offspring. She even replenishes the supply of caterpillars if needed. Also, after she has closed her burrow with fresh clay, she searches for a tiny pebble of just the right size and shape, and holding it firmly in her jaws, uses it as a "tamping tool" to tamp the dirt down solidly so that no trace of her work can be seen. Except for man, she is among a very few of the earth's creatures habitually to use a tool.

Another large hunting wasp that I often see is the golden digger wasp (*Sphex ichneumoneus*). It is strikingly colored, with a black, orange-trimmed body and reddish-orange legs. The female stocks her nest chambers with long-horned grasshoppers and crickets.

The true artisans of the insect world are the little jug-making potter wasps (*Eumenes fraterna*). On slender twigs of trees and bushes, the female designs and fashions beautiful little clay jugs, with narrow necks and flaring tops, as nest chambers for her young. Hundreds of centuries before any human potter had shaped his clay upon the wheel, *Eumenes fraterna* was an expert at her trade, always following the "pattern" handed down by her ancestors. After the jug is finished, she lays an egg and suspends it from the top of the cell by a delicate thread, so that it hangs down like a pendulum in the chamber. After stocking it with paralyzed caterpillars she seals it with fresh clay and goes on her way. After spending the winter in the clay cell, chilled and dormant, the young wasp changes to a pupa in the spring and soon to a winged adult wasp that cuts a round hole in the side of the jug and escapes.

Throughout our hardwood forests, several species of wood-boring grubs live and make their tunnels deep in the wood of dead and dying trees and in logs. If any creatures could be considered safe from all enemies, surely these must be. But not so. For one of the largest of our native insects, the giant ichneumon wasp (*Megarhyssa*) also live in these forests and, with an extremely long ovipositor that can be used as a very efficient drill, is a specialist in locating and parasitizing these grubs, particularly the *Tremex* variety.

Just how this great wasp is able to locate the grub down deep — often 3 inches or more — in the log or tree trunk no one precisely knows. In some way she is able to pick up the vibrations made by the feeding *Tremex* or other species of grub, perhaps with her extremely sensitive antennae, or somehow sense its movements in the wood. However this may be, by carefully prospecting up and down the log or tree trunk,

she eventually finds the right location to begin the drilling operation, just above a *Tremex* burrow. Her drilling mechanism consists of three separate horsehair-like appendages that, when brought together, form the world's most amazing drill.

Looking something like an oil rig, with her stilt-like legs spread wide apart and the two ovipositor sheaths looped over her back she thrusts the sharp cutting tip of the drill deeper and deeper into the wood until the burrow is reached. She then lays an egg on

Big Game Tag Report

Number 13

. . . a summary of North Carolina's big game harvest for 1988-89 as reported by hunters to Wildlife Cooperator Agents

Why should a hunter go out of his way to tag and report the turkey gobbler he just shot? How many deer were harvested during the season here in North Carolina? Was the total deer harvest for this period greater or less than this figure for last season? How is this information used? These are questions that often surface during discussions of North Carolina's big game tagging system. The big game tagging system is a reporting procedure which requires that all wild turkey, boar, bear and deer which are harvested by hunters here in the state be tagged at the site of harvest and that certain information be reported to any one of approximately 1,500 Wildlife Cooperator Agents for later collection by the Wildlife Resources Commission. This procedure became mandatory in the fall of 1976. Successful game management is based on many factors and individual pieces of information, including in this case, big game harvest figures. The more a game manager knows about population trends and numbers, the easier it is for him to make decisions affecting seasons, bag limits and other regulatory matters. Sound big game management must be the result of the combined efforts of sportsmen and the staff of the Wildlife Commission. While the figures in this report represent the reported harvest and may vary from the actual harvest, they are the best such figures available at this time. Please do your share to see that future reports of this nature are as complete as possible by tagging and reporting your big game harvests and by encouraging your fellow sportsmen to do the same.

If you have questions about the procedures or this report, please contact the Division of Wildlife Management, North Carolina Wildlife Resources Commission, 512 N. Salisbury Street, Archdale Building, Raleigh, North Carolina 27611.

1988-89 Reported Black Bear Harvest

County	Male	Female	Total	Game Land	Other Land	Unk. Land	Rifle	Shot-gun	Hand-gun	Gun Unk. Or Other
Avery		2	2	2			2			
Beaufort	17	17	34		34		32	1		1
Bertie	3	5	8		8		4	4		
Bladen	19	11	30	2	28		18	11		1
Brunswick	12	5	17		17		10	5	2	
Buncombe	4	7	11	2	9		11			
Burke	3	1	4	4			4			
Caldwell	1		1			1			1	
Camden	8	6	14		14		11	2	1	
Carteret	6	4	10	1	9		10			
Cherokee	8	11	19	16	2	1	13	6		
Clay	11	12	23	20	1	2	19	2	2	
Columbus	6	1	7		7		2	4		1
Cumberland	5	1	6		6		1	5		
Duplin	2		2	1	1		1		1	
Gates	6	7	13	2	11		6	6	1	
Graham	21	11	32	31	1		26	5		1
Haywood	14	9	23	20	2	1	22	1		
Henderson		2	2		2		2			
Hyde	25	15	40		40		39		1	
Jackson	5	1	6	6			6			
Jones	12	15	27	9	18		23	3	1	
Macon	19	13	32	31		1	31	1		
Madison	18	8	26	25	1		26			
McDowell	19	12	31	21	9	1	23	8		
New Hanover	4	2	6		6		4	2		
Onslow	7	4	11		11		9	2		
Pamlico	5	6	11		11		10	1		
Pasquotank	3	6	9		9		5	4		
Pender	20	21	41	6	35		30	10	1	
Rutherford	2	1	3	2		1	3			
Sampson	4	1	5		5		3	2		
Swain	4		4	4			4			
Transylvania	8	1	9	8		1	9			
Tyrell	6	3	9		9		8		1	
Washington	9	5	14		14		12	2		
Yancey	8	3	11	1	9	1	10	1		
Totals	324	229	553	214	329	10	449	88	12	4

1988-89 Reported White-Tailed Deer Harvest

County	Sex Harvested				Antlered Bucks Per Sq. Mile*	Weapon					Location	
	Antlered Bucks	Button Bucks	Does	Total		Shotgun	Rifle	Muzzle-loader	Bow	Hand-gun	Game Lands	Other Lands
Alamance	341	31	97	469	1.79	48	280	100	37	1		469
Alexander	177	15	51	243	1.06	12	155	47	28		1	242
Alleghany	523	48	172	743	4.32	25	422	134	156	2		743
Anson	962	169	595	1,726	2.73	352	1,030	226	88	6	29	1,697
Ashe	503	80	204	787	2.06	6	464	175	135	2	19	768
Avery	69	5	10	84	0.38	2	67	3	9		64	20
Beaufort	1,538	129	729	2,396	3.26	175	2,011	118	22	1	103	2,293
Bertie	1,507	313	1,534	3,354	3.03	2,163	1,002	74	33	3	56	3,298
Bladen	2,265	248	1,029	3,542	3.40	1,933	1,371	105	64	7	83	3,459
Brunswick	1,337	109	535	1,981	2.06	1,477	403	64	8	1	23	1,958
Buncombe	162	35	261	458	0.38	15	416	13	7	4	44	414
Burke	716	54	210	980	1.85	31	773	51	109	3	190	790
Cabarrus	53		2	55	0.34	40	4	9		1		55
Caldwell	417	31	86	534	1.17	24	422	31	52	1	152	382
Camden	207	4	12	223	1.44	108	97	4	6			223
Carteret	352	38	201	591	1.17	226	314	39	10	1	88	503
Caswell	1,108	207	598	1,913	4.25	637	784	342	133	5	225	1,688
Catawba	150	13	35	198	0.94	13	125	27	33		2	196
Chatham	1,180	118	470	1,768	2.51	220	996	358	173	8	360	1,408
Cherokee	17			17	0.04	2	14				16	1
Chowan	517	57	270	844	6.30	291	475	30	28	5		844
Clay	88		1	89	0.50	1	79	6	2		66	23
Cleveland	178	13	17	208	0.86	6	162	18	12	5	6	202
Columbus	1,858	61	485	2,404	2.86	1,478	726	101	27			2,404
Craven	1,377	65	476	1,918	2.78	347	1,383	104	44	3	96	1,822
Cumberland	843	105	454	1,402	2.30	213	1,080	49	49			1,402
Currituck	291	54	138	483	2.75	225	231	6	13	3	2	481
Dare	94	2	9	105	0.36	28	31	24	21	1	73	32
Davidson	577	69	237	883	2.23	44	563	174	83	2	50	833
Davie	304	19	100	423	2.74	28	244	93	53	4		423
Duplin	1,092	61	310	1,463	2.37	594	808	32	9	1	13	1,450
Durham	143	18	51	212	0.93	89	73	29	16	1	71	141
Edgecombe	1,212	155	590	1,957	4.89	704	1,036	118	39	3		1,957
Forsyth	48		8	56	0.35	4	39	3	8			56
Franklin	860	68	208	1,136	3.08	741	318	35	25	1	62	1,074
Gaston	10	1	2	13	0.06	1	6	2	4			13
Gates	1,272	367	1,257	2,896	5.26	2,266	513	60	19	13	18	2,878
Graham	34			34	0.12	1	31	2			29	5
Granville	984	87	390	1,461	2.99	463	714	167	103	6	118	1,343
Greene	80	1	4	85	0.65	32	53					85
Guilford	117	14	43	234	0.72	44	140	24	20	2		234
Halifax	1,855	490	1,850	4,195	4.58	1,547	2,238	193	90	15	54	4,141
Harnett	158	1	2	161	0.48	80	64	10	5		1	160
Haywood	200	4	18	222	0.49	4	179	7	25	1	204	18
Henderson	146	5	8	159	0.64	4	129	8	17	1	104	55
Hertford	533	159	476	1,168	2.29	902	242	9	3	2		1,168
Hoke	132		3	135	0.53	105	23	2	3	1		135
Hyde	758	125	616	1,499	2.18	147	1,032	188	70	2	60	1,439
Iredell	401	55	178	634	1.61	32	409	96	89		3	631
Jackson	11			11	0.03		11				11	0

County	Sex Harvested				Antlered Bucks Per Sq. Mile*	Weapon					Location	
	Antlered Bucks	Button Bucks	Does	Total		Shotgun	Rifle	Muzzle-loader	Bow	Hand-gun	Game Lands	Other Lands
Johnston	289	13	112	414	0.73	128	245	15	20	3		414
Jones	1,191	102	610	1,903	3.35	204	1,588	66	8	2	101	1,802
Lee	160	2	4	166	0.97	22	99	29	14		18	148
Lenoir	300	23	136	459	1.57	67	380	1			2	457
Lincoln	68	3	2	73	0.47	14	40	11	8			73
Macon	188	2	4	194	0.43	9	168	5	9		154	40
Madison	114	3	10	127	0.34	2	91	14	19	1	90	37
Martin	1,023	92	447	1,562	3.58	980	501	32	12	2	9	1,553
McDowell	374	27	83	484	1.03	21	377	23	57	4	208	276
Mecklenburg	43	5	14	62	0.19	33	1	8	18			62
Mitchell	128	5	9	142	0.79		104	9	26		38	104
Montgomery	1,377	173	523	2,073	3.52	236	1,170	477	159	5	293	1,780
Moore	306	4	86	396	0.58	264	101	16	5		10	386
Nash	374	9	62	445	1.35	163	258	4	9			445
New Hanover	97	10	68	175	0.96	70	86	10	3	1		175
Northampton	1,557	276	1,176	3,009	4.88	1,485	1,278	105	60	15	9	3,000
Onslow	1,266	178	715	2,159	2.37	1,227	846	34	13	1	32	2,127
Orange	554	32	172	758	2.46	159	361	164	64	1		758
Pamlico	517	16	105	638	2.72	50	546	23	4	3	5	633
Pasquotank	191	5	15	211	2.33	96	104	3	1			211
Pender	1,833	254	1,148	3,235	2.56	1,495	1,516	76	58	4	75	3,160
Perquimans	448	33	145	626	3.83	226	359	10	18	1		626
Person	627	51	228	906	2.90	349	378	127	34	2	25	881
Pitt	1,052	111	552	1,715	3.45	162	1,404	52	18	8		1,715
Polk	182	5	20	207	1.02	3	164	14	22		106	101
Randolph	418	50	124	592	0.88	62	387	93	43	3	30	562
Richmond	655	59	273	987	1.86	592	341	33	15		66	921
Robeson	456	40	233	729	1.05	472	215	17	11			729
Rockingham	611	46	172	829	2.02	115	459	140	97	2		829
Rowan	387	40	162	589	1.74	56	348	105	63	4	28	561
Rutherford	473	41	133	647	1.18	26	544	33	34	2	51	596
Sampson	969	47	338	1,354	1.80	505	743	32	19	3		1,354
Scotland	372	8	24	404	2.01	285	76	4	32		120	284
Stanly	390	28	115	533	2.38	58	290	110	68	4	4	529
Stokes	180	11	40	231	0.68	23	142	28	38		2	229
Surry	221	11	44	276	0.81	11	185	54	20	2		276
Swain	19			19	0.04		16	1	2		13	6
Transylvania	244	3	7	254	0.74	6	223	7	12		200	54
Tyrrell	206	2		208	0.83	20	159	21	4		5	203
Union	77	1		78	0.29	6	61	2	2	1		78
Vance	356	16	87	459	2.56	179	234	20	16		11	448
Wake	263	10	24	297	0.60	51	182	37	22	1	58	239
Warren	889	139	593	1,621	2.99	1,016	530	32	9	5	31	1,590
Washington	233	14	71	318	1.51	27	248	30	6		2	316
Watauga	79	2	12	93	0.42	2	56	19	16		4	89
Wayne	135	3	26	164	0.56	38	108	10	7			164
Wilkes	908	62	187	1,157	1.64	19	748	249	128	2	69	1,088
Wilson	50			50	0.32	18	32					50
Yadkin	207	8	10	225	1.52	8	138	36	42		2	223
Yancey	258	12	24	294	1.00	5	196	32	60		118	176
State Total	53,132	5,790	24,177	83,099	1.79	28,995	43,008	5,983	3,405	200	4,485	78,614

*Square miles of forest as index of deer habitat.

1988-89 Reported Wild Boar Harvest

County	Male	Female	Total	Game Land	Other Land	Unk. Land	Rifle	Shot-gun	Hand-gun	Gun Unk. Or Other
Burke		1	1		1				1	
Cherokee	7	9	16	11	5		9	5		2
Clay	1	3	4	3		1	2	1	1	
Cleveland		1	1		1				1	
Graham	38	39	77	61	12	4	63	10		2
Macon	1	2	3	3			3			
Polk	1		1	1			1			
Rutherford	1	1	2	2			2			
Swain	1		1	1					1	
Totals	50	56	106	82	19	5	80	16	4	4

1988 Reported Wild Turkey Harvest

County	Adult	Juvenile	Unk.	Total	Land	Private	Unk.	Shotgun	Bow	Muzzle	Unk.
Allamance	16	5	1	22		22		20			2
Alleghany	42	26		68		68		66			2
Ashe	79	20	3	102	6	81	15	97		1	4
Avery	1			1	1			1			
Bertie	57	2		59		51	8	54	1		4
Bladen	5			5	4	1		5			
Buncombe	11	2		13	3	7	3	13			1
Burke	2	1		3	2		1	2			1
Caswell	196	24	3	223	29	173	21	209			14
Chatham	12	2		14	1	12	1	12			2
Cherokee	37	5		42	36	6		42			
Clay	11			11	10	1		9		2	
Columbus	1			1		1		1			
Franklin	2	1		3	1	1	1	2			1
Graham	22	1		23	16	6	1	18			5
Granville	15	1	2	18	1	13	4	16	1		1
Guilford	1			1		1		1			
Halifax	18	7		25		23	2	24			1
Haywood	2			2	2			2			
Henderson	11	2		13	6	7		13			
Jackson	1			1			1	1			
Jones		1		1	1			1			
Macon	30	3		33	29	1	3	33			
Madison	10	4		14	5	8	1	11			3
Martin	26			26		26		25			1
McDowell	8	2		10	9	1		10			
Montgomery	14	3		17	3	14		17			
Moore	1			1		1		1			
Northampton	18	4	2	24		22	2	23			1
Onslow	44	1		45		45		44			1
Orange	10			10		10		10			
Pender	2	1		3		3		2	1		
Person	65	8		73	8	56	9	70			3
Richmond	16	1		17		17		17			
Robeson	7			7		5	2	7			
Rockingham	14	4		18		18		18			
Surry	22	4		26		26		25			1
Swain	6	2		8	3	3	2	8			
Transylvania	20	2		22	13	5	4	17			5
Vance	1			1		1		1			
Wake	1			1			1	1			
Warren	2			2		1	1	2			
Watauga	5	2		7	3	3	1	7			
Wilkes	6	5		11		11		11			
Yancey	4	1		5	1	4		5			
Totals	874	147	11	1,032	193	755	84	974	3	3	53

MORE THAN JUST A STINGER

***The common yellow** jacket is a social wasp with a temper. Whereas paper wasps are not aggressive, except when provoked, yellow jackets make up for their small size with sizzling stingers.*

the grub or near it. Upon hatching, the ichneumon larva attaches itself to the *Tremex* grub and begins feeding upon it. The grub is doomed to die in its own "safe" burrow. Next summer, a giant ichneumon wasp will emerge from the wood, not an adult *Tremex*.

Among many species of parasitic wasps is the striking black-and-scarlet "cow killer" or velvet ant. It is not an ant at all but a female wingless wasp with a wicked sting. Also there is the jewel-like cuckoo wasp, with a shimmering emerald-green body, that was named after the European cuckoo for its habit of laying eggs in the nests of other solitary wasps.

From many parts of the country, people observing our solitary hunting wasps have reported numerous examples of their extraordinary intelligence and seeming powers of reason. These creatures, however, surprise and astound us not by their reasoning powers, but by the wisdom of instinct. In realms of low intelligence, as in the insects, instinct oversees, commands, and guides with a great unconscious wisdom, somehow foreseeing and making preparation for creatures yet unborn.

A man can spend a lifetime asking questions and seeking answers only to be left standing awed and wondering. Of Thoreau it was said that he "saw beauty in ashes," a beauty to which most other men were blind. In nature there is such beauty wherever we walk, be it in the green of spring or the snows of winter. And even in the smallest backyard lie wonders and mysteries beyond our comprehension. Contemplating the whole miracle of life, I am reminded of how, over a century ago, the great English naturalist, Charles Waterton, summed it all up in four noble words: "We can but bow."

EVINRUDE

How-To For Hybrids

When fisheries biologists crossed the striped bass with the white bass, they came up with a hybrid some fishermen swear is half mule. Here's how to catch these superb gamefish.

written and photographed by
Pete Elkins

Some of the best fishing in North Carolina is for striped bass landlocked in large inland reservoirs. Less well-known, however, are the similar angling opportunities for a fish that's a hybrid of the striped bass and white bass. Known as the Bodie bass in North Carolina (so designated in honor of Bodie McDowell, long-time outdoor editor of the Greensboro Daily News), these various hybrid crosses have increasingly become popular in recent years since the first ones were developed by fisheries biologists in South Carolina.

Their popularity is the result of two characteristics. For one thing, they are fierce fighters on hook and line, and in South Carolina are affectionately called "Palmetto mules." Anyone familiar with the stubborn nature of a mule and the fighting qualities of the hybrid will quickly understand the connection. A second favorable characteristic is the hybrid's ability to prosper in waters that are too warm and shallow for stripers. North Carolina is blessed with better landlocked striper habitat than most southeastern states, but the hybrid is proving to be an excellent consolation prize for those waters that are not particularly suited for stripers.

And what a consolation prize these fish are! Hybrids grow rapidly, and strike lures and baits eagerly. While they don't grow as big as stripers, they often reach a weight of around 3 pounds — averaging somewhat more than largemouth bass in most of our waters. Best of all, perhaps, I agree with most fishermen that they are far stronger pound-for-pound than either the largemouth or striper. In my opinion, a 1-pound hybrid can pull a largemouth bass of equal size right out of its socks in a tug of war.

While I'm an avid largemouth angler, striped bass are my favorite species. Before I caught my first hybrid, I caught hundreds of big stripers up to 30 pounds in lakes throughout the Southeast. My first hybrid hit a jigged Hopkins spoon in about 20 feet of water. After the first powerful surge, I smugly predicted to my fishing partner that it was a striper in the 12- to 15-pound class. When that fish finally surrendered beside the boat, however, it turned out to be a 6-pound hybrid.

My under-estimation showed me the

***Hybrids are** striped bass, white bass crosses, and many anglers believe that, pound for pound, they fight more strongly than any other freshwater fish. Since hybrids reach fairly large size, they are rapidly becoming one of the state's most prized gamefish in the many lakes where they have been stocked. Tail-spinners and other bottom-bumping lures (above) are good bets for hybrids in the summer.*

***Perhaps the** most reliable lure for hybrids is a short, heavy forged spoon. Not only can it be jigged when hybrids are schooled up in deep water, it can also be retrieved rapidly along the surface when the fish are on top feeding on shad. In such instances, the author often lets the spoon sink and flutter like a wounded baitfish for brief moments while skittering the spoon on or near the surface.*

power of a hybrid, and all hybrids I've caught since have verified that power. Yet even big hybrids in the 10- to 12-pound class are perfectly matched for conventional largemouth bass tackle. Only heavy currents and the need for casting distance below dams may dictate heavier tackle.

Casting or spinning gear will suffice, and your choice depends entirely upon your preference. I've found that spinning gear may be better when hybrids are feeding on newly hatched shad because spinning reels with 6- to 8-pound monofilament simply cast the required small lures more efficiently.

For casting bucktails or plastic grubs—both reliable hybrid offerings—a stiffish graphite rod in the 6- to 7-foot range is probably your best bet. A similar rod is also well matched for hopping a Little George tailspinner lure along the bottom and this is perhaps the deadliest year-round tactic for hybrids.

Except for tossing lures lighter than 1/4 ounce, however, free-spool casting reels offer some advantages. Hybrids are rarely line-shy in most Tar Heel waters; thus, heavier mono in the 12- to 17-pound class can be used, and casting reels handle this heavier line better than fixed spool reels.

Bait-casting tackle excels for slinging vibrating plugs like Rattletraps, Hot Spots, or other relatively heavy lures to surface feeding or suspended fish. Vertically jigging spoons are also best handled on casting tackle.

With tackle considerations resolved, the next task is to locate the fish. Obviously, you want to make sure that the waters you're fishing have hybrids. If your friends aren't sure, call your local wildlife enforcement officer, fisheries biologist, or visit a local tackle store or marina. Most likely, one of these sources can give you the information you need.

An accurate depthfinder in skilled hands is fundamental to most hybrid success. Two exceptions come to mind. Taking hybrids which are mauling shad below a dam in the spring doesn't require a depthfinder. Nor is a depthfinder essential during the summer-to-winter months when hybrids are on the surface. In fact, after the arrival of gulls in early fall at many lakes, hybrids feeding on or near the surface are often "bird dogged" by gray and white funnels of diving birds.

But there is a problem with this surface fun because it's sporadic and uncertain except under ideal conditions. Ideal conditions mean calm winds, heavy overcast or cloud cover, and no other boats in the area, and finding all three conditions is becoming increasingly difficult.

When hybrids stop feeding on the surface, however, a depthfinder is vital. Simply move into the area where the fish were feeding, and start looking. Generally speaking, once the fish are pinpointed, they can be caught. Locating subsurface hybrids varies little from locating largemouth bass under similar conditions. Both species stay near bottom structure, and are highly vulnerable to jigging spoons. Hybrids are apt to move more rapidly than bottom-hugging largemouths, and are also more inclined to suspend below large concentrations of shad.

On virtually any Carolina lake with a fishable hybrid population, good bottom structure in the 15- to 30-foot range coupled with nearby shad concentrations will hold hybrids in both the summer and winter. In autumn, hybrids may feed at much shallower depths throughout the day.

Catching the deeper fish is fairly simple, especially if your boat is rigged with two depthfinders. One should be a chart recorder mounted on the boat's console, the other should be an accurate flasher or liquid crystal unit mounted on the bow with a transducer on the electric motor shaft.

Once you locate a potential hybrid area, search it slowly with the chart recorder. As soon as the fish appear on the chart, drop a marker buoy to pinpoint the fish. This will provide a reference point if the fish move as you fish for them. After marking the fish, hold the boat directly above them by combining the electric motor and bow-mounted depthfinder. By dropping a Hopkins 75 spoon straight down below the flasher, you can often track the descent down to the blips of the hybrids. Standard vertical-jigging tactics will then produce strikes, especially in the fall and winter months.

While spoon jigging for downstairs hybrids remains my favorite method, there's nothing quite like the drama of surface-feeding hybrids. If, like the old platitude, you can keep your head while all about you hybrids are going berserk on the surface, you are a cool dude. Given that criterion, I will never be much of an angler because when big hybrids are knocking shad into the air only a few rod lengths from the boat, my nervous system overloads.

A quick glance at surface-feeding hybrids will tell you what approach is likely to be best. If the hybrids are obviously taking shad right on the surface, a topwater offering is in order. Lures with double props, poppers, striper swipers and other standard surface lures will produce. Be careful not to throw too large a lure, however. Hybrids, even big ones, don't have mouths as large as a striper or largemouth, and a big surface plug like a Cordell Redfin that a striper would inhale rarely draws strikes from hybrids.

One of my favorites is an unorthodox, but

***A scrappy hybrid** comes to the net, but not willingly. While a variety of lures will catch hybrids, smaller artificials are usually preferred because these fish do not have big mouths. Drifting live shad is also an excellent technique at times.*

highly effective, popping cork and popping bug combo. Though awkward to cast and most often used for salt water spotted seatrout than freshwater species, the popping cork rig can be uncannily productive. Simply use a standard popping cork with weighted stern section trailing a 20- to 30-foot mono leader with a white popping bug.

The chugging cork imitates the surface swirl of a feeding hybrid, and a real hybrid will dart over to see what's up. When he does, he'll spot the helpless bug looking like a combat-fatigued shad and promptly gulp it. It's a great rig, and the single hook facilitates quick release of a boated hybrid. Incidently, don't overlook this rig for largemouth bass feeding on tiny shad, an equally frustrating situation. Largemouth will sometimes maul this rig after turning up their snouts at every other lure in the tackle box.

As fall gives way to winter, hybrids can be found swirling on top, but they may actually be taking bait just below the surface. This requires a different approach. A vibrating plug like a Rattletrap should be cast beyond the school, then retrieved through them with a slow pumping action. Stay alert for a strike as the lure settles downward after a lifting pump of the rod. Also, sometimes a straight, slow retrieve is the ticket.

Even when hybrids are on the surface, I always keep a Hopkins spoon rigged for action. The spoon is too versatile to ignore. If the fish are on the surface, the spoon can be cast beyond them, then retrieved with either a slow pumping action or rapid skitter along the surface. On the other hand, if the fish suddenly go back downstairs, I can instantly drop the spoon down to their new feeding level.

Some of the new high-speed casting reels are especially useful when hybrids are surface feeding. If you have just fired a long, blind cast 50 yards north, and a pod of hybrids foam the surface to the south, it can seem like an eternity until you reel the lure in for another cast. A hybrid is also a zippy fighter, much quicker on its fins than a largemouth, and when a big one changes direction after being hooked, the fast-retrieve reel will help you keep up.

Their speed and power, coupled with increasing availability, make hybrids an important part of North Carolina's fishing future. Just ask one of the increasing number of fishermen at Jordan Lake or other hybrid-rich waters to name their favorite fish. More and more will chose the hybrid. Some of my hardcore bass buddies still haven't been convinced, but my boat will never pass up an opportunity to tango with hybrids upstairs or down. ⊡

KEN TAYLOR

THREE *for the* SEA

Until recently, North Carolina's three public aquariums were relatively unknown, but their dazzling displays and hands-on programs are rapidly gaining an enthusiastic following.

by Eddie Nickens

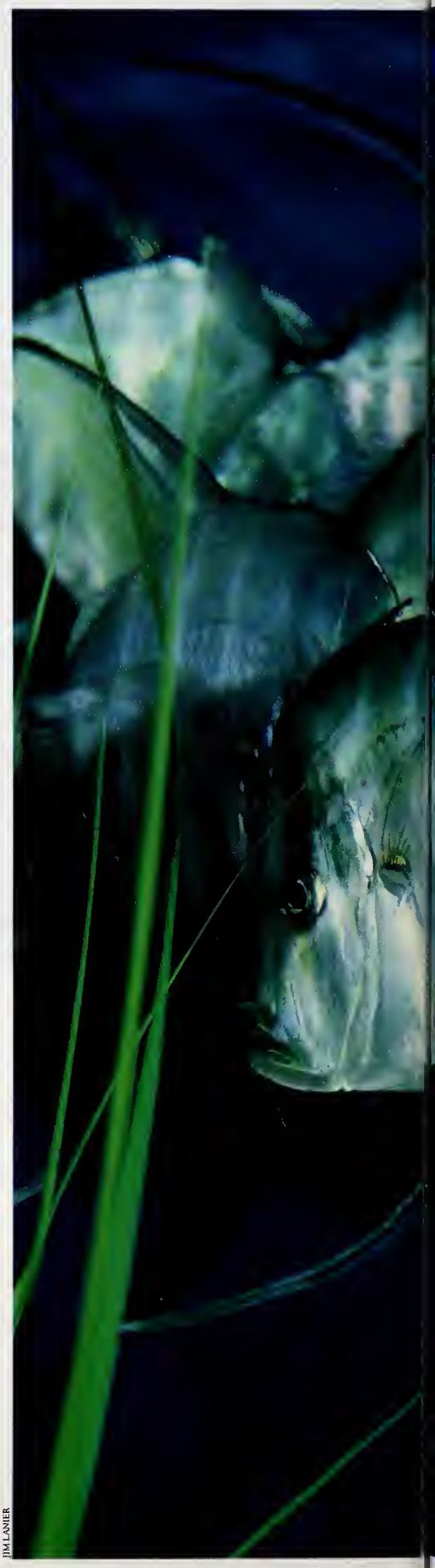
It is summer, 1988. August-hot and middle-of-the-day humid. The 50-foot trawler *First Mate* has been gone from the dock at Pivers Island near Morehead City 30 minutes, pounding its way past Phillips Island where ibis, egrets and oystercatchers nest in a raucous community before coming to rest in the waters of the Newport River. The short trip brought a welcome breeze, but it wasn't enough to dry the brow of Beth Irlandi, instructor for the North Carolina Aquarium at nearby Pine Knoll Shores. She's sorting through oyster rock and shell fragments dumped from a basket net dredged along the river bottom while two dozen grade-schoolers ooh and aah at each sea urchin, worm tube and spider crab she holds aloft. *What's that? Are they gonna die? What does this do?* A little girl in mock surfer attire is transfixed by a hermit crab; Irlandi is pummeled with questions.

Soon the boat turns to the open waters of Bogue Sound for a trawling run. First the tickler chain plunges underwater; it will spook bottom-dwellers into the net behind. All eyes are riveted to the swirl of water where the net has disappeared. *What will we find? What will we see? What will come up, shark or flounder, crab or eel?* An ibis floats by, wings pounding salty air. No one notices. The focus is on what lies below.

It is winter, 1989. Soaked by a three-day rain, the Outer Banks is nearly barren of visitors. Inside the North Carolina Aquarium at Roanoke Island, a handful of visitors crowds against the glass tanks set into the walls like television screens lined up in a department store, each turned to a different station. A hammer drums against a wall stud somewhere behind a makeshift partition, while a voice spills from an unseen speaker: "The fish are now being fed in the main aquarium gallery."

"They're feeding the fish! They're feeding the fish!" cry two youngsters, jumping up and down, tugging on their parents' arms before pressing faces even more solidly against the glass. One of the children, the youngest, turns back to father and mother. Quite solemnly he asks, "But how do you feed a fish?"

So how do you feed a fish? And what?



JIM LANIER

***Exotic lookdown** fish knife through the waters of a tank at one of the state's three public aquariums. North Carolina is home to the only state-supported aquariums in the nation. Visitors (above) get a first hand look at marine life in the touch tanks at the North Carolina Aquarium at Pine Knoll Shores near Morehead City.*

These two scenes give evidence of the most oft-used words at each of the state's three public aquariums, favorite words closely followed, of course, by "shark" and "crab," "ooh" and "uh-huh." Sprinkle in a few "wows" and a "neat" or two, and you've summed up the vocabulary that illustrates the driving force behind these facilities of state government: the marriage of wonder and education. Last year a record 1,494,601 visitors crowded into the aquariums at Roanoke Island, Pine Knoll Shores and Fort Fisher, some to join field trips to nearby marshes, others to pile on boats for dredging and trawling expeditions. Some went to learn the Japanese art of Gyotaku (fish pressing to make art prints) or for lessons in seafood cookery. But most of those million-and-a-half guests simply wandered through the halls, content with a somewhat self-guided tour of the universe beneath the waves and the worlds that share that alien kingdom: marsh and sand dune, ocean current and tidal flat.

In those halls today visitors will find thousand-gallon tanks that harbor bluefish and spiny lobsters, loggerhead sea turtles and tiny tropical angelfish, long lanky moray eels and even longer lemon sharks. They will also find interactive computers that field questions concerning the life cycle of the salt marsh, or touch tanks filled with horseshoe crabs and pinfish, and exhibits of river otters at play in a specially designed marsh habitat. A few steps away they might explore the habits of humpback whales — to the sounds of whale songs taped underwater — or study an exhibit outlining the history of the Outer Bank's U.S. Life Saving Stations.

Whatever one finds on a visit to one of North Carolina's three public aquariums, chances are that he or she will respond with the wide-eyed reaction that has become the trademark of these, the only state-supported aquariums in the country.

For staffers at the aquariums — directors, designers, education specialists, bookstore managers, curators — those reactions mean they've been doing their jobs well. It also means that they have their work cut out for them in the future, for much like potato chips, one visit isn't nearly enough. Keeping

BILL RUSS

***A 49-foot replica** of a humpback whale overlooks the main gallery and touch tanks of the North Carolina Aquarium at Fort Fisher near Wilmington. Located near the most densely populated and heavily visited points of the North Carolina coast, the aquariums are among the state's most popular public attractions, drawing crowds last year of almost 1.5 million.*

KEN TAYLOR

Sand tigers, *nurse sharks and loggerhead sea turtles inhabit this 20,000-gallon tank at the Fort Fisher Aquarium. Baby loggerhead turtles (below) form part of an exhibit on sea turtles. Loggerheads are becoming rare on the North Carolina coast as development encroaches on breeding sites.*

the exhibits changing and the visits fresh is a top priority for planners.

Strategically located at the three most densely populated — and most heavily visited — areas along the coast, the North Carolina Aquariums spent their first 10 years as the marine resources centers, a well-received if somewhat misunderstood part of the state's Office of Marine Affairs. Visitation grew steadily during that first decade, eventually surpassing annual figures at the North Carolina Zoological Park and the combined yearly totals of all North Carolina historic sites.

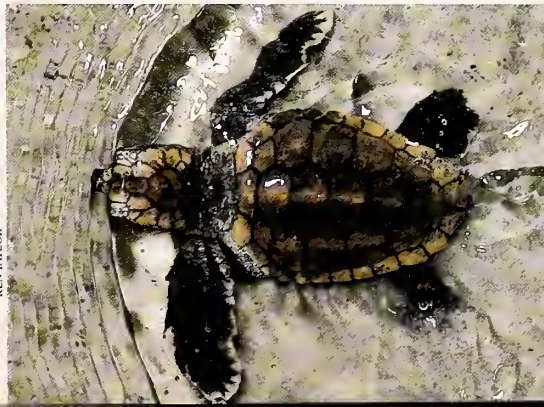
Then, in 1986, as part of their tenth-year anniversary, the marine resources centers were renamed the North Carolina Aquariums in a move to more closely reflect their programming. In the same year, the private, non-profit North Carolina Aquarium Society was formed to solicit and administer funds from individuals and corporations to add to and diversify exhibits at the Aquariums. In three years the Society has raised over a million dollars, helping propel the North Carolina Aquariums into the second year of a five-year plan designed to give the facilities a total facelift: new exhibits, new space and new life.

"We're changing the places from the front door to the back," said Mark Joyner, executive director of the North Carolina Aquarium Society. "There's more going on here than just putting in new exhibits. When a visitor comes back next year, we'd like for him to see a changed aquarium."

Those changes are a result of the success of more than a decade of doing it right. The aquariums' role as an educator in an environment that is increasingly in the news makes the growth of the aquariums all the more important, and all the more exciting.

"We're trying hard to become one of the major players in the education and awareness movement concerning the coastal environment," said Dr. Neal Conoley, director of the North Carolina Office of Marine Affairs, which presides over the three aquariums. "The coastal environment is becoming more and more significant to this state. It's important, it's fragile. That's why we're becoming more habitat-oriented. When visitors leave, we want them to know what a surf zone is, we want them to know about a pier-piling environment. It makes sense educationally, and it makes sense from a naturalists' standpoint."

And those changes, from a new name to a new partner to a tighter focus, are paying off. "Before, when we were known as the marine resources centers, I had to spend half our publicity time explaining just what we were, and that we had tanks," said Dr. Jim



KEN TAYLOR

***Touch tanks** are fun, but they are also an important tool for the aquariums' mandate to educate the public about our state's fragile marine resources. The tanks allow for a hands-on experience, giving visitors a chance to examine marine animals in a lifelike environment.*

N.C. AQUARIUM

***Sea urchins** are just some of the sea life recovered by Beth Irlandi, instructor and crew leader for a dredging and trawling expedition sponsored by the Aquarium at Pine Knoll Shores. In addition to popular indoor exhibits, all three aquariums offer a variety of field trips, classes and programs for visitors.*

EDDIE NICKENS

Lanier, director of the Fort Fisher Aquarium, which is located 12 miles south of Wilmington. The Aquarium Society—a "remarkable success," according to Lanier—has made it possible for the aquariums to open exhibits such as the Grady-White Shark Gallery at the Roanoke Island Aquarium, funded by Grady-White Boats. Others include Pine Knoll Shores' new "Loggerhead Odyssey" exhibit, funded by the Carolinas' Chapter of the Safari Club International, and a planned stingray and skate exhibit scheduled to open at the Fort Fisher site in the fall of 1989.

"The real story is a kid that comes down from Mocksville and pulls up a net; you can really see the wonder in his eyes," said Joyner. "That's the moment. That's the teachable moment, and you seize it. That's when you can say, 'This is the male, this is the female, and these are the problems they are facing.' That's what we're about."

A tour through any of the aquariums will quickly make it evident how well the three centers have evolved to reach their goals. Suspended from the ceiling are mounted fish—sharks, dolphin, drum—and everywhere you turn, brightly colored exhibits beckon with flashing displays and fantastic graphics. At each aquarium a main gallery offers a fish-eye view of a variety of marine species, from loggerhead sea turtles to grouper to the exotic lookdown fish with its distinctive sloping forehead, thin as a butter knife. And while each aquarium is devoted to the study and appreciation of marine life at large, each offers in-depth study of the distinctive regions in which they are located. At the Fort Fisher Aquarium, exhibits offer a look at environments representative of the Cape Fear region. In one tank the bottom of the Masonboro Inlet jetty is replicated with 60-million-year-old marl, a type of sea-bottom rock mined and sold for ripraps and jetties. At the Roanoke Island Aquarium an 1,100-gallon tank holds striped bass, a declining species that spawns in the waters of nearby Albemarle Sound, the largest freshwater sound in the country. At Pine Knoll Shores, an unusual cut-away model of a loggerhead sea turtle nest shows how hatchlings make their way to the surface.

"We want to be able to respond quickly to whatever is out there," explained Joyner, "whether it is an awareness of nesting sea turtles or a high number of Portuguese men o' war. If the red tide is on everyone's mind, then that's a teachable moment. We're in the right place. Right now there is a lot of emphasis on the coast—plastics pollution, coastal development—and people are knocking themselves out to get in the doors."

And standing in line to get *out* of doors, as well. Not only do the North Carolina Aquariums provide an unparalleled opportunity to learn about residents of the sea, shore and salt marsh through exhibits, films and indoor activities, but field trips, classes and hands-on programs offer visitors the chance to slosh through tidal marshes, seine estuarine systems and learn how to cook squid—opportunities available virtually nowhere else.

"This is a paradise for marine field trips," said Dr. Lanier of the Fort Fisher Aquarium site. "We have an ocean beach, but we also have a sheltered marsh. We have this beautiful environment around us (Carolina Beach State Park) which provides us with plenty of habitat." There are bath house facilities for changing, outside showers and an indoor mini-laboratory area for closer examination of treasures found on field trips. The Aquarium at Pine Knoll Shores rents boats owned by the Duke University Marine Laboratory at Pivers Island for field trips, while the Aquarium at Roanoke Island has its own 28-foot pontoon boat to take visitors on explorations of nearby estuarine waters, and coordinates road trips to destinations such as the Currituck National Wildlife Refuge and Buxton Woods, a maritime forest on Hatteras Island. Every day throughout the year, at each aquarium, something is planned. It could be a film about humpback whales, slide talks on sharks or demonstrations of marine life camouflage.

JIM LANIER

***A blue angel** hovers in an exhibit at the Fort Fisher Aquarium which replicates the undersea jetty environment of nearby Masonboro inlet. Each aquarium offers exhibits that are unique to their respective regions.*

"It is indicative of the diversity of the North Carolina coast that the three aquariums can offer such diverse orientation," said Rhett White, director of the Roanoke Island Aquarium. The waters of the Tar Heel shoreline are a meeting place for the cold Labrador current of the north and the warm Gulf Stream to the south, resulting in a meeting place where both northern and southern species commingle.

"I think it's always been our charter to interpret the North Carolina coast rather than go beyond this area," agreed Dr. Ned Smith, director of the Pine Knoll Shores Aquarium. "The diversity is one of the most exciting things about working here. Witness the exhibit we're working on now: a 12,000-gallon shipwreck tank that will show off the reef fishes and colorful schooling fishes found here. That's the type of thing that makes us exciting to visitors."

All of this excitement and recreation has a purpose, of course, although it's difficult to tell someone that they're in a learning process when they're busy having fun while pressing an inked fish to rice paper during a Gyotaku demonstration.

Visiting An Aquarium

The North Carolina Aquarium at Roanoke Island is located near Manteo. Call (919) 473-3493.

The North Carolina Aquarium at Pine Knoll Shores is located on Bogue Banks near Morehead City and Atlantic Beach. Call (919) 247-4003.

The North Carolina Aquarium at Fort Fisher is located near Kure Beach, 12 miles south of Wilmington. Call (919) 458-8257.

All three aquariums are open to the public. Admission is free, although some field trips, classes and demonstrations require pre-registration and a fee. The aquariums are open Monday through Saturday from 9 a.m. to 5 p.m., and Sunday 1 p.m. to 5 p.m.

For more information about membership and services of the North Carolina Aquarium Society, contact the Society at 400 Oberlin Road, Suite 300, Raleigh NC 27605; or call (919) 733-2291 or toll free 1-800-832-FISH.

Moved From South Carolina

Wild Turkeys Released On Restoration Sites

Written and Edited by Angela Dorman Hill

North Carolina's expanding wild turkey population got a boost recently when 70 turkeys trapped in South Carolina were released on eight restoration sites here.

Biologists with the N.C. Wildlife Resources Commission relocated the birds to geographic regions and environmental conditions similar to their South Carolina homes. Hunting will be prohibited on these North Carolina restoration sites for a minimum of three years to allow the turkey population to increase. Owners of the land on which the turkeys were released will help the Wildlife Commission manage the habitat and protect the birds. The landowner must agree to allow trapping from these areas for further restocking for 12 years after the release.

MELISSA McGAW

Heading Home: *Wildlife Commission photographer Melissa McGaw caught this wild turkey hen in action as the hen soared to her new home in Harnett County. It was one of 70 wild turkeys moved from South Carolina to North Carolina as part of the Wildlife Commission's wild turkey restoration project.*

MELISSA McGAW

Banded: *Wildlife biologists put identification bands on one of the wild turkeys brought from South Carolina before its release on the North Carolina restoration site.*

"We didn't think we'd get the birds this year," said Mike Seamster, who heads the Commission's wild turkey program. "We got lucky. It's a great opportunity for our state to boost its turkey population. We've also been able to work out trades with other states to get turkeys. In 1986, we traded river otters to West Virginia for wild turkeys."

The National Wild Turkey Federation has offered help to states interested in re-establishing their dwindling turkey populations. The Federation will set up a superfund for each state that joins the program. The money can only be used for habitat acquisition and improvement, and turkey restoration and research.

The Wildlife Commission recently approved spending $80,000 to continue restoration of the state's turkey population. Part of these funds will be used to reimburse South Carolina for its $500-per-bird trapping-and-relocation costs.

"The reimbursement fee that North Carolina pays for these turkeys will go into the superfund of the S.C. Chapter of the Wild Turkey Federation," Seamster said. "They plan to use the money to buy public hunting lands."

During the early 1970s, the Wildlife Commission launched an intensive wild turkey restoration program to replenish the state's turkey population. Since then, wildlife biologists have moved 1,100 wild turkeys. When the program was intensified in 1970, the state's turkey population was estimated at 2,000 birds. In 1980, the population jumped to 8,000 birds. Now, it is estimated at more than 15,000.

Safe Boaters Safer Waters

National Safe Boating Week is June 4-10, and the week serves as a reminder to the nation's 70 million boating enthusiasts that their sport can be dangerous. More than 1,000 people will lose their lives in boating accidents this year. The number of boating fatalities exceeds the number of fatalities in airline accidents, commercial shipping accidents, and rail accidents each year.

The major contributing factor for boating accidents in North Carolina is operator inattention.

"Boat operators should pay attention to what's happening in and around their boat," said Colonel Ragland, Chief of the Division of Enforcement.

Presented By N.C. Wildlife Federation

Commissioner, Employees Get Conservation Awards

Four employees and one commissioner of the N.C. Wildlife Resources Commission have been honored with governor's awards for conservation.

Sen. Terry Sanford presented awards in 21 wildlife and environmental categories during the 44th annual convention of the North Carolina Wildlife Federation. Top honors went to John Lentz of Ellerbe, a member of the N.C. Wildlife Commission and a past president of the N.C. Wildlife Federation, as he was named North Carolina Conservationist of the Year.

Also winning awards were four Wildlife Commission employees: James B. Geouge of Cedar Mountain was named Wildlife Enforcement Officer of the Year; Commission biologist Dennis Stewart of Greenville was named Water Conservationist of the Year; Lt. Kenneth Craft of Lewiston was named Hunter Safety Educator of the Year; and Joseph Mickey Jr. of State Road in Surry County was named Soil Conservationist of the Year.

Lentz, who has served one term as president and three terms as vice president of the Wildlife Federation, was appointed to the Wildlife Commission in 1987 by former Lt. Gov. Bob Jordan. He is a director of the N.C. Forestry Association, chairman of the Federation's N.C. Conservation Education Fund, and president for 22 years of the Sandhills Rod and Gun Club.

Lentz helped organize the Richmond County chapters of Ducks Unlimited, Quail Unlimited and the county Forestry Association. Among his numerous conservation awards are the Wildlife Commission's Silver District Conservation Award of Merit and the Edwin L. Key Memorial Award for Service and Ethical Sportsmanship.

Geouge, an enforcement officer assigned to Wildlife District 9, has made many wildlife-oriented presentations which included a mini-course at Brevard Middle School. He spent vacation time teaching boating and firearms safety to underprivileged children. "Enforcement officers should keep hard-core violators cussing, make youthful or occasional violators have second thoughts and instill a sense of security in young children instead of fear," he says.

Stewart, a field biologist with the Commission's Wildlife Management Division, evaluates the environmental impact of projects involving wetlands. He has become one of the state's leading authorities on wetland protection. His graduate work on the river otter made him keenly aware of the importance of maintaining quality wetland habitat for wildlife.

Lt. Kenneth Craft, a 15-year veteran Commission employee, has instructed more than 1,200 people in the safe use of firearms. He has served two terms as president of the N.C. Wildlife Officers Association and is a past president of the Bertie County Law Officers Association. He oversees firearm training for law enforcement officers in Bertie, Hertford and Northampton counties, and teaches a women's firearm class at Roanoke-Chowan Community College.

Mickey, a biologist with the Commission's Boating and Inland Fisheries Division, saw the trout waters of Laurel Creek filling with tons of sediment caused by development. Laurel Creek is a tributary of Mitchell River, which was recently declared an Outstanding Resource Water. Mickey reported the problem to the news media. Because of his action, legislation is expected to pass this year to eliminate a logging loophole in the state's Sedimentation Act.

ANGELA DORMAN HILL

Prestigous Awards: *Four Wildlife Commission employees and a commissioner display the coveted Governor's conservation awards presented to them recently during the annual convention of the N.C. Wildlife Federation.*

Volunteers Asked To Assist

Fall Cleanup of Inland Areas Planned

The Wildlife Resources Commission is looking for a few good men and women.

The Commission needs volunteers to work as zone captains to help organize this year's Inland Sweep, which, in conjunction with Beach Sweep, will be the largest cleanup in the state this year.

Inland Sweep will remove trash from lakes, rivers and streams that are marred by litter. The program, scheduled for this September 23, is modeled on the highly successful Beach Sweep, an award winning operation dedicated to cleaning up the state's beaches. As trash is collected in these sweeps, the different types of garbage are entered on data cards, which are subsequently placed into a national data base for analysis.

In the weeks prior to the event, schools and the mass media will spearhead an educational and publicity campaign to generate interest in the cleanup.

Zone captains will be the local contact for a chosen cleanup site and will be responsible for directing its cleanup. There will be posters, buttons, and T-shirts for the volunteers. If you know of an area that needs cleaning up and if you would be available as a volunteer, please contact the Education Programs Coordinator, Division of Conservation Education, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27611 or call 919-733-7123.

They Become Effective July 1

WRC Adopts New Hunting, Fishing Regulations

The N.C. Wildlife Resources Commission has adopted new regulations for the 1989-90 hunting, fishing and trapping seasons. Most of the proposed changes taken to the nine statewide public hearings in February were approved. But some proposals were modified after sportsmen voiced opposition. The following reflects most of the new seasons and regulations that become effective July 1, 1989.

DEER

The following are regulation changes for deer hunting:

— Increase the season bag limit in the Eastern and Central deer season areas that have gun either-sex seasons to five. That would include two antlered, two hunter's choice and one antlerless deer. The special antlerless deer tag would continue to be limited to counties or portions of counties specially designated as either-sex areas.

— Permit the harvest of either-sex deer during the muzzleloading season as a part of the regular season bag in the Eastern and Central deer seasons in those areas that have an either-sex gun season including game lands that allow either-sex hunting.

— Allow the harvest of either-sex deer on the last day of the muzzleloader season in those areas that have a gun either-sex deer season, including those game lands with a scheduled either-sex hunt in the following areas: counties within the Northwestern deer season and in Burke, Caldwell, Cleveland, McDowell and Rutherford.

— Open a gun deer season from Nov. 13 – Jan. 1 in Cumberland County, that part north of N.C. 24 and east of N.C. 210 and in Sampson County, that part west of N.C. 242 and north of U.S. 13.

— Open a designated portion of the Belews Creek Steam Station in Stokes County to an either-sex hunt for youth on Oct. 21.

— Establish or extend the either-sex deer season in the following counties:

November 29:

- Wilson
- Cumberland: that part south of SR 1709, west of U.S. 301, and east of the Cape Fear River
- Davidson: that part north of I-85, except game lands
- Johnston: that part north of U.S. 70 and west of I-95
- Mecklenburg: that part west of I-77, south of N.C. 73, east of the Catawba River, and north of N.C. 16 and SR 2004 except for the Cowan's Ford Waterfowl Refuge
- Moore: that part north of N.C. 211, except game lands
- Nash: that part south of U.S. 64
- Rowan: that part north of I-85 and west of U.S. 52, except game lands
- Wake: that part south of N.C. 54 west of Raleigh and south of U.S. 70 east of Raleigh
- Wayne: that part north of U.S. 70

November 29-30:

- Camden
- Dare
- Scotland: that part north of U.S. 74, except game lands
- Tyrrell: that part south of U.S. 64

Nov. 29-Dec. 2:

- Lee
- Columbus: that part west of a line formed by U.S. 74, SR 1005, and SR 1125
- Cumberland: that part east of I-95 and south of N.C. 24
- Robeson: that part east of a line formed by SR 1005, U.S. 301 and I-95

Nov. 29-Dec. 9:

- Pamlico: except game lands
- Stanly: that part east of U.S. 52 and north of N.C. 24-27, except game lands
- Washington: that part west of N.C. 32 and south of U.S. 64

Nov. 29-Jan. 1:

- Brunswick
- Beaufort: except game lands
- Bladen: except game lands
- Columbus: that part east of a line formed by U.S. 74, SR 1005, and SR 1125
- Craven: except game lands
- Edgecombe: that part north of U.S. 64
- Jones: except game lands
- New Hanover: that part north of U.S. 74
- Onslow: except game lands

Dec. 9: Buncombe, Haywood, Henderson, Madison, Polk, Transylvania

— Require that all harvested big-game animals be registered by a wildlife cooperator agent before they are butchered, except in cases where the kill occurs in a remote area which prevents the animal from being transported as an entire carcass. In these cases, the carcass may be tagged, skinned, quartered, and transported to the wildlife cooperator agent for reporting.

— Allow the confiscation of any big game tag that has been detached from the big game license without being properly validated.

BEAR

— Delete the Hollow Ground Swamp Bear Sanctuary in Tyrrell and Hyde counties and the Dismal Swamp Bear Sanctuary in Pasquotank and Perquimans counties.

— Open the bear season during the period Nov. 13-18 in the following areas: Camden, Craven and Pasquotank counties.

WILD BOAR

— Prohibit hunting wild boar on bear sanctuaries during the bow-and-arrow season in and east of the counties of Yancey, McDowell and Rutherford.

TURKEY

— Establish turkey seasons in the following areas and close all other sections of the state until turkey populations expand to permit hunting:

Alleghany, Ashe, Bertie, Buncombe, Burke, Caswell, Cherokee, Clay, Durham, Graham, Granville, Hyde, Jackson, Macon, McDowell, Mitchell, Onslow, Orange, Person, Rockingham, Scotland.

Parts of Alamance, Anson, Bladen, Brunswick, Caldwell, Carteret, Chatham, Chowan, Columbus, Craven, Guilford, Halifax, Haywood, Henderson, Hoke, Johnston, Jones, Madison, Martin, Montgomery, Northampton, Pender, Perquimans, Richmond, Robeson, Swain, Transylvania, Watauga, Wilkes, Yancey.

— Require special permit in order to hunt wild turkeys on the Sandhills Game Land.

WATERFOWL

— Prohibit unauthorized activities such as waterfowl hunting and harassment of waterfowl on posted waterfowl management areas established by the Commission for Canada goose and waterfowl restoration.

GAME LANDS

— Establish a two-day gun either-sex deer season of Nov. 29 and Dec. 2 on the Holly Shelter Game Land and Bladen Lake State Forest Game Land.

— Establish a permit system for managed hunting on Pamlico Point, Campbell Creek and Spring Creek waterfowl impoundments that will require a permit for hunting after Nov. 1 on the opening and closing days of the waterfowl season, all Saturdays, Thanksgiving Day, Christmas Day and New Year's Day.

— Allow horseback riding on the Caswell and Thurmond Chatham game lands only during the months of June, July and August and on Sundays during the remainder of the year except during the open deer and turkey seasons. Riding is limited to those game land roads open to vehicular traffic and riders must have a valid game lands license.

— Add two tracts totaling 1,390 acres to the Catawba Game Land and prohibit deer hunting on these two tracts.

— Prohibit the possession of a rifle or pistol larger than .22 caliber rimfire on game lands during the closed season on big game. The following are recommended changes in fishing regulations for 1989-90:

GAME FISH

— Delete the following from Designated Public Mountain Trout Waters: Flannery Fork in Watauga County, Mitchell River in Surry County, Christian Creek in Surry County, Wildcat Creek in Wilkes County, Sandy Mush Creek in Buncombe and Madison counties and Cheoah River in Graham County.

— Add the following to Designated Public Mountain Trout Waters as general trout waters:

- Pauls Creek in Surry County from the Virginia State Line to SR 1625
- Swannanoa River in Buncombe County from SR 2702 bridge near Ridgecrest to Sayles Bleachery in Asheville except where posted against trespassing.
- Lake Powhatan in Buncombe County on the Pisgah National Forest Game Lands.

— Add the following to Designated Public Mountain Trout Waters as native trout waters:

- Harris Creek and tributaries on Stone Mountain State Park in Wilkes County.

— Redefine "snagging" as pulling or jerking a device equipped with one or more hooks through the water for the purpose of impaling fish.

— Establish an eight-fish daily creel limit and a 15-inch minimum size limit for sauger.

— Establish a four-fish daily creel limit for largemouth bass in Sutton Lake in New Hanover County with no harvest of fish between the lengths of 12 and 16 inches. Only two bass less than 12 inches may be retained in the daily creel limit.

— Establish a 12-month trout season in native trout waters.

Quail Habitat Gets Boost

Quail Unlimited Donates $6,000

The future of small game may well be brighter in North Carolina if groups like Quail Unlimited continue their work. Quail Unlimited members in North Carolina contributed more than $6,000 in 1988 to the N.C. Wildlife Resources Commission's quail research program.

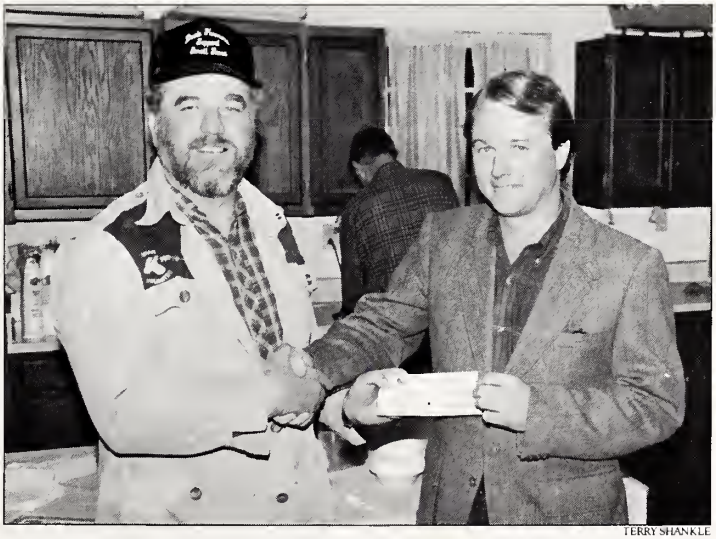
But their contributions to quail research don't stop with financial donations. Local chapters of Quail Unlimited spend dollars and hours cultivating land into ideal quail habitat and teaching farmers and other landowners how to do the same.

For instance, the 72-member Davie County Chapter has helped create other chapters in Iredell and Forsyth counties and has coordinated quail-food planting projects with local 4-H clubs. The club has distributed $3,000 worth of free seed and fertilizer to Davie County farmers and landowners and has helped them plant it to boost quail habitat. Club members have planted or advised the planting of at least 1,000 acres of land in Davie County.

In recent years, quail research has intensified in North Carolina and across the Southeast as quail populations have nosedived. "There's been enough research and now it's time for hands-on work," said Robert Cooke, president of the Davie County Chapter of Quail Unlimited. "We know the sport of quail hunting is becoming endangered because of a loss of habitat. Farmers are helping us a lot. We've tried to pay them to leave rows around their fields, but they won't let us.

"We're not hunting the seed-plotted areas, and landowners say they're seeing small-game populations increase. In this county, the rabbit population is ten times what it was five years ago."

Quail Unlimited chapters in North Carolina make their money through annual fund-raisers and auctions.



TERRY SHANKLE

Quail Funds: *Wildlife Commissioner Howell Woltz (right) accepts a check for $700 from Robert Stone, president of the Davie County chapter of Quail Unlimited. The funds will be used by the Commission's Division of Wildlife Management to buy water pumps, rakes and other equipment used by biologists and technicians for prescribed burning.*

Scheduled For June 5-11

Fishermen Celebrate Fishing Week

Even the grumpiest of Tar Heels wear a big grin each spring as they grab their rods and reels and head for water. This year, National Fishing Week may be the perfect opportunity to take part in other celebrations of the angler's craft. National Fishing Week will be observed June 5-11.

One place to be during National Fishing Week will be any one of the N.C. Wildlife Resources Commission's six fish hatcheries where open house is held throughout the week. Visitors can view the fish in their tanks, and they can tour the facilities.

In addition to open house, the Fayetteville hatchery will host a fishing clinic on Saturday, June 10. The clinic is part of the Commission's CATCH (Carolina Anglers Teach Children How) Program. Experienced fishermen will teach children ages 8 through 15 to identify fish, understand fish habitats, and know when to fish and where.

KIM GARNER

Big Catch: *Malcolm Southerland of Wayne County holds his catch-of-the-day for photographers during a CATCH clinic at Sleepy Creek. CATCH clinics are scheduled by the Wildlife Commission across the state throughout the summer to teach young people how to fish.*

The Wildlife Commission's fish hatcheries and their locations are as follows:

- Fayetteville State Fish Hatchery (Fayetteville). (919) 867-6390.
- Armstrong State Fish Hatchery (Marion). (704) 756-4179.
- Table Rock State Fish Hatchery (Morganton). (704) 437-3977.
- Pisgah Forest State Fish Hatchery (Pisgah Forest). (704) 877-3121.

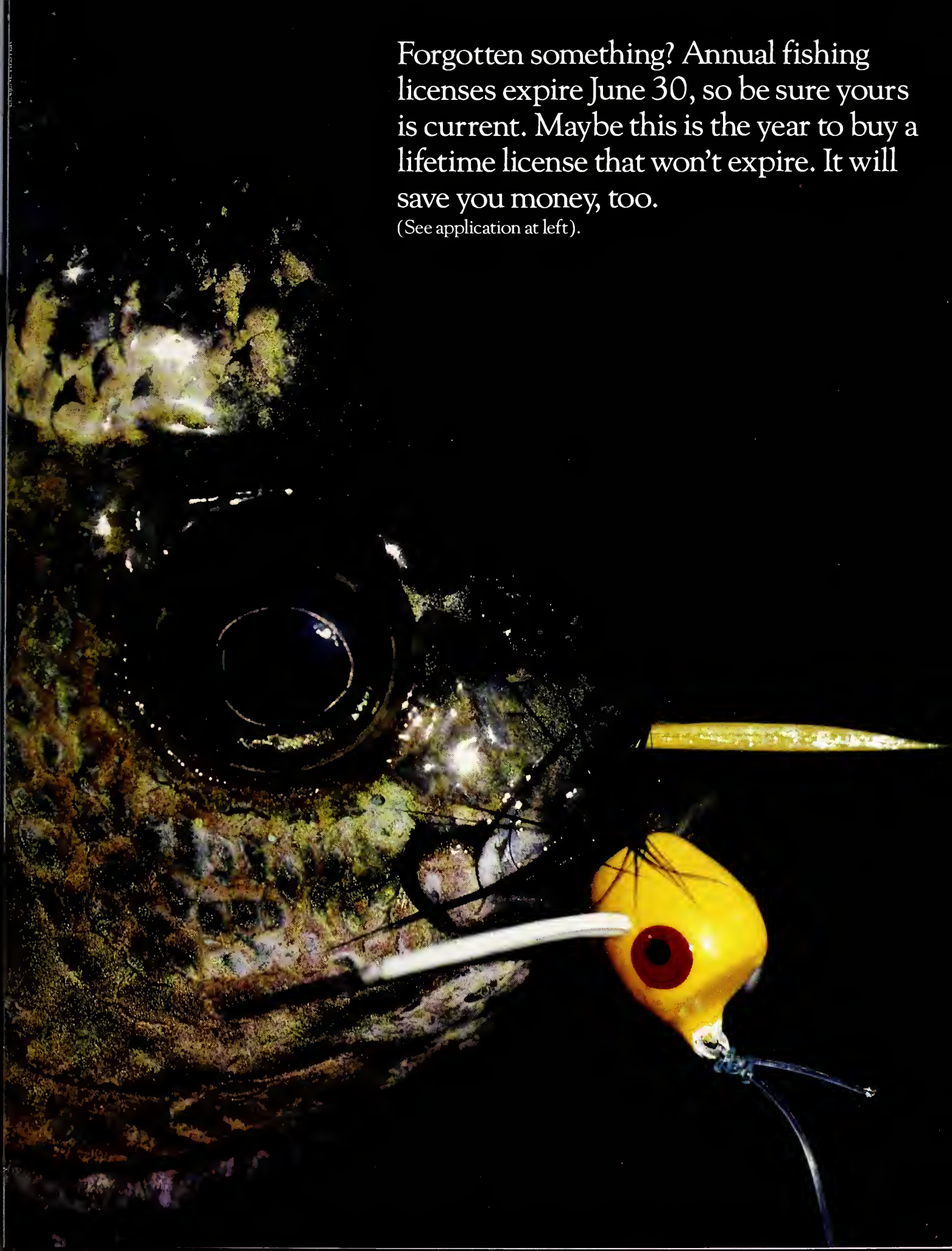
Many other CATCH fishing clinics will be held throughout the state during the spring and summer months. For a complete calendar of CATCH events, write the N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh NC 27611.

New Brochure On Endangered Wildlife Species

The U.S. Fish and Wildlife Service has published a brochure that explains the federal government's listing process for endangered species.

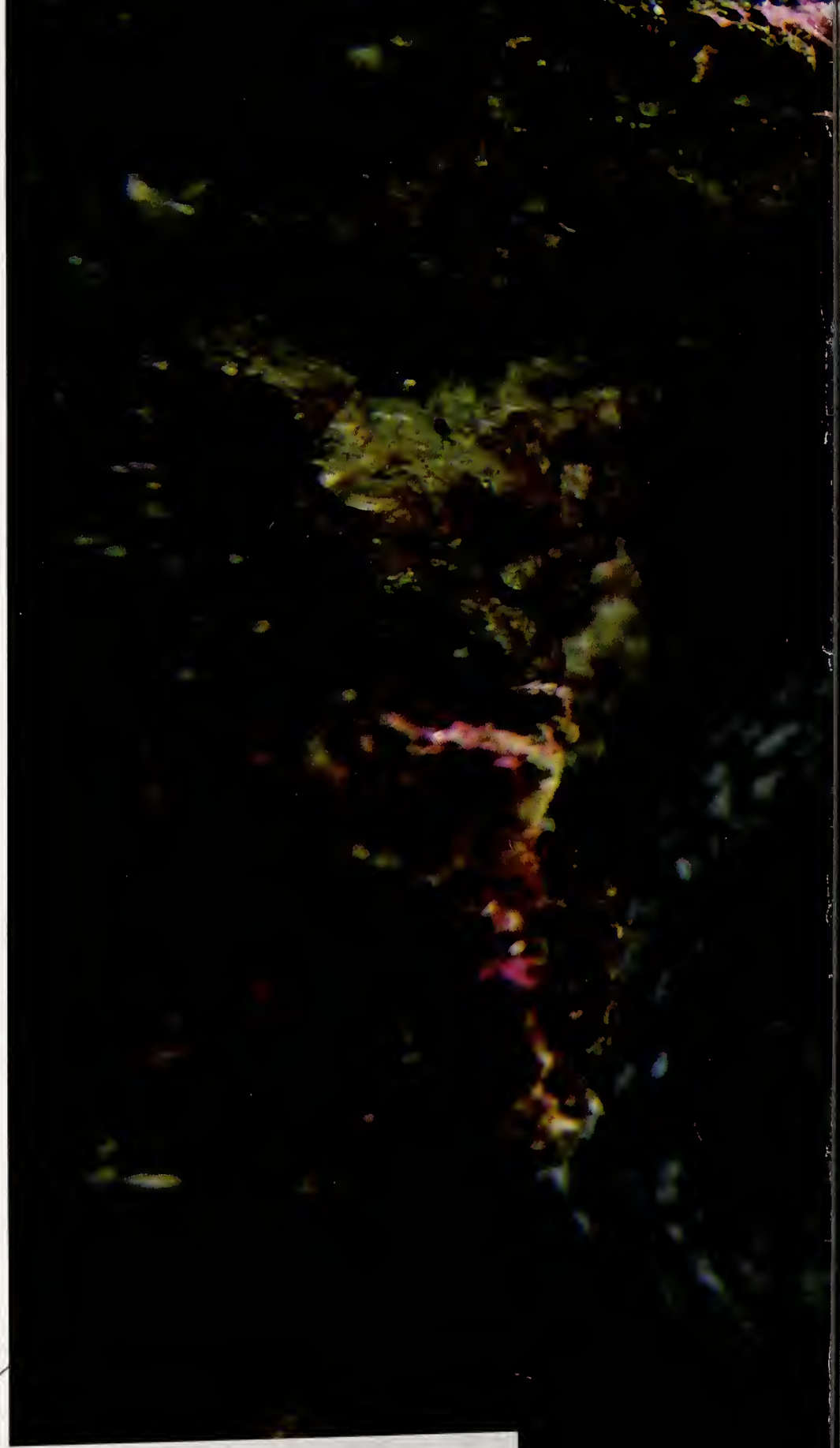
The pamphlet also stresses the need to preserve crucial habitats as well as the animals that dwell in them. It provides information on the efforts to restore the populations of endangered species and how people can get involved.

The free brochure is available by writing the Consumer Information Center, Department 572V, Pueblo, CO., 81009.



Forgotten something? Annual fishing licenses expire June 30, so be sure yours is current. Maybe this is the year to buy a lifetime license that won't expire. It will save you money, too.

(See application at left).



That's A Moray!

Wearing colorful markings that bely its hidden teeth, an ocellated moray eel peeks out of a rocky crevice in its display at one of North Carolina's three coastal aquariums.

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WILDLIFE IN NORTH CAROLINA

JULY, 1989 75 CENTS

Getting There Is All The Fun

by Jim Dean

Time for the annual summer appreciation trip. I can't take you, of course, but I can tell you what it's like. The only real requirement is to pick a route through eastern North Carolina. You may wind up at the beach. Then again, you may not.

It's best to leave about 6:30 in the morning while it's still cool and the traffic is light. Head east and pick the backroads where you can drive 45 miles an hour or less without holding up a long line of traffic. Roll down the window and listen to the buzz of insects in the fields and ditches as you pass. It's a nice sound, conducive to the state of mind you're seeking, and something you wouldn't hear with the air conditioning on and a tape in the deck.

JOHN ROTTET

Mood is important. Ideally, you want a relaxed, reflective sort of energy—the kind that follows a good night's sleep, two cups of caffinated coffee (take a chance, for Heaven's sake), and the anticipation of going. As silly as it sounds, the perfect song to have in the back of your mind is "Lavender Blue," the theme from "So Dear To My Heart," that old, wonderfully sappy Disney movie about kids growing up in the summer on a farm. Those times were not that simple, of course, but nevermind. You're looking for a different kind of reality, remember?

It may help to think how much you love your fellow man, but don't dwell on it. You'll too quickly think of exceptions. Anyway, ignore any rudeness you encounter. You don't want this day spoiled by some beach-bound BMW on your bumper, so let it pass. Put your body in first gear, your mind in overdrive. Roll on.

Look for passing postcards, perhaps a field of soybeans stretching away to a distant white farm house in a grove of ancient oaks. If you had many lives to live, you could spend one of them there. You know there are cicadas singing in those oaks. At noon, someone may sit in the shade and eat a platter of home-grown tomatoes in vinegar, or turn the crank on a White Mountain. Surely you recall the taste of homemade peach ice cream straight from the dasher, and how it was your job to poke your finger into the drain hole to keep the cold, salty water flowing.

Farther on, you pass a Victorian house set well back from the road at the end of a long driveway lined with cedars. It has a fine porch, one that extends all the way across the front of the house and halfway down the side. On the porch are wicker chairs, gliders with cushions, flower pots and ferns. Didn't you sit on just such a porch once? And in the evening, didn't you help shell butterbeans and watch the fireflies while bullfrogs drummed in the ditch. Would we really need psychiatrists if we still spent summer evenings on such porches?

Wave at folks sitting on porches, or farmers driving tractors. They'll wave back, if they don't wave first. Admire the tobacco barns, count the cows, and see if you can spot just one mule. Check out the crops. Corn's a little dry, but the cotton looks good. Soon, there will be stray tobacco leaves and tufts of cotton strewn along the shoulders of the road, and bales of wheat in the fields. We've lost autumn's picturesque stacks of peanuts and shocks of corn, though. Nor do you see much sugar cane these days. It began to disappear in the eastern part of the state after the war when sugar was no longer rationed. Who puts molasses in coffee these days, or spoons it on a clabber biscuit the size of a catcher's mitt?

You don't have to spend the whole time driving. The following stops are authorized. You can pull off at a roadside vegetable stand or yard sale, wander through a flea market, or get yourself a vanilla milk shake. You can also stop at an old millpond where you might still be able to buy a bag of stone-ground cornmeal. Farther east, it is permissible to pause at any bridge crossing a blackwater river. If the yellow flies aren't too thick, you might even want to take a short walk down the bank under cypress hung with Spanish moss. Take along a cold RC and pour a bag of peanuts in it.

You should be getting the hang of this by now. If you really are heading for the beach, you'll soon be passing huge flat fields where corn soars in long rows over the black soil. Somewhere along here, you will drop onto a beach that's 20 million years old, but you probably won't know it. Ranging south out of Virginia to Carteret County, the Suffolk scarp marks this ancient beachhead, and in some places, you could find the fossil shells in the road cuts. Eventually, the dark earth will yield to sand, and you may imagine that you can smell the salt blowing in on a Bermuda high.

At this point, I suspect you will be more than a little heartened at the prospect of getting this miserable trip behind you. The kids are fighting in the backseat, adults are no longer on speaking terms, the potato chips that fell down the neck of your shirt are beginning to itch, the dog has been hassling in your ear for three hours, and the air-conditioning is on the fritz. You see, dear hearts, I really do live in the real world sometimes.

Ah yes, but if only.

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *These snow geese rising over Cape Hatteras were painted by Louis Frisino, and this painting is featured on the 1989 North Carolina Migratory Waterfowl Stamp. Funds generated by the sale of stamps and prints help pay for waterfowl conservation in the state.*

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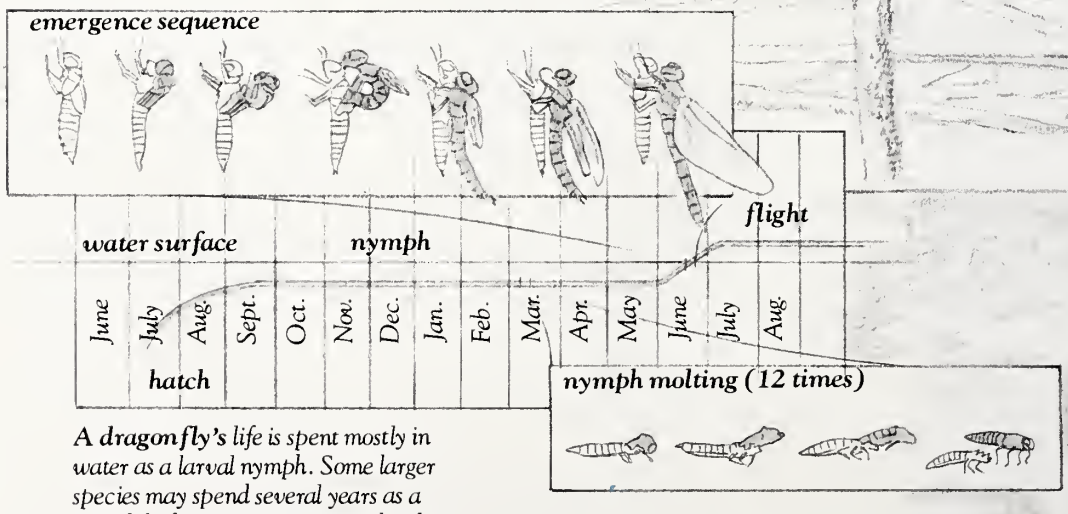
Ancient Winged Warriors

written by David S. Lee / illustrated by David Williams

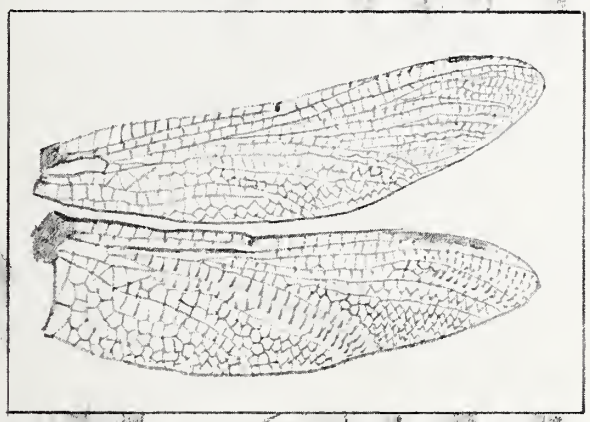
Since the beginning of the Devonian period, dragonflies have been haunting the earth's damp areas. In those mist-shrouded carboniferous forests over 300 million years ago, at least some of the dragonflies had wingspans as long as a man's arm. Their order, *Odonata* (to which all dragonflies and damselflies belong), is not only one of the oldest groups of flying insects, but also among the most interesting. Indeed, there are British and international societies which study and admire these agile fliers. There is much about these insects that fascinates — their social behavior, flight, carnivorous appetite (*Odonata* means toothed), and development from water-dwelling larvae to winged adults.

***The larvae of** all dragonflies live in the water, transforming themselves into adults in much the same way by first climbing out of the water. There, the skin of their thorax splits revealing two pairs of wing sheaths. As the split widens, the young dragonfly literally crawls out of its own skin. The wings, at first only crumpled stumps, unfold and extend. Emergence and transformation varies with species from a few minutes to two hours, but as soon as the wings dry, the dragonfly is in the air.*

***Soon after they** emerge from their larval form, dragonflies become voracious aerial predators capturing flying insects on the wing. Generally, the larger species patrol high in the air, while smaller dragonflies hunt close to the water near protective vegetation.*

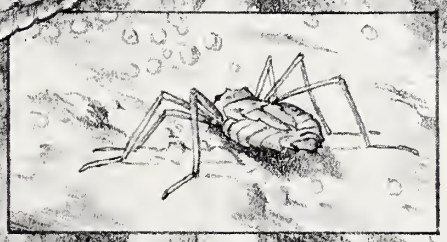


***A dragonfly's** life is spent mostly in water as a larval nymph. Some larger species may spend several years as a nymph before emerging to spend a short life as a flying adult. Adult dragonflies are killed by cold weather in the fall.*



The dragonfly's *wings are light, strong and highly efficient. The strength of the wing is achieved through well-placed, inner-locked angles that resemble the trusses in a roof, and give dragonflies both speed and maneuverability. Speeds up to 18 miles-per-hour have been recorded. Most dragonflies are territorial, hovering and darting to defend hunting and breeding areas.*

The surest way *to distinguish between dragonflies and their close relatives, damselflies, is by their wings. At rest, dragonflies hold their wings horizontally, revealing hinged sets of wings that are larger at the base. Damselflies have four wings the same size and shape, and hold them vertically at rest.*



Dragonflies in the *larval stage vary considerably in size and shape, and the two most commonly encountered types are pond and stream dwellers. Pond species have elongated bodies easily concealed in aquatic vegetation, while stream dwellers have flattened bodies and long legs to help them hold onto rocks.*

***Hot summer** days are the best time of year to observe dragonflies. Exact identification of species can be difficult, however, requiring careful study of wing vein structure under a magnifying glass. Of the 5,000 species, most are found in the steamy tropics, but some 150 species are found in North Carolina. The dragonfly at right is a green jacket, a common skimmer.*

MELISSA McGAW

Dragonfly Days

Countless "snake doctors" wrap our waters in a lazy summer buzz this time of year. Imagine what it must have sounded like in prehistoric times when some had 2-foot wing spans.

by David S. Lee

The sound of clashing armor drew my attention. Hovering on transparent wings, the battle-weary green dragon once again had to defend his lair. The dragon sized up its opponent and charged. Although intense, the battle was short-lived. The defender was more experienced, and after a few spiraling rounds, the intruder retreated. The victor landed and groomed himself.

A midsummer fantasy? Perhaps, but while the actors were mere 3-inch dragonflies and the stage a corner of a neighbor's pond, to me the action and excitement surpassed the tales of medieval writers. With my back supported by a tree, I lazily surveyed the pond with my binoculars, a perfect way to squander a summer morning. Patroling dragons had all the edges of the pond staked out. Cruising back and forth over their allotted portions, they defended air space and perches, darting quickly at intruders. In the hour I watched, my champion from earlier that day won at least eight more battles, and had a few in-flight snacks.

I have been curious about dragonflies for a long time, and each summer I have intermittently attempted to learn more about them. They are a good hobby for a time of year when weekend chores can consume the free time of anyone caught hanging around the house. Dragonflies are creatures of the sun and air and on hot summer days when most wildlife is making itself inconspicuous, the dragons are at their best. Furthermore, North Carolina has more than a modest number of species, and many

Dragonfly Days

KEN TAYLOR

***Vegetation around** ponds and streams is a favored dragonfly lair. Adult male dragonflies are quite territorial, fiercely defending their perches and domain from interloping males during breeding season. The dragonfly above is a skimmer.*

of them are quite colorful.

When I first began studying dragonflies eight years ago, summer became a season of telephoto lenses and wet tennis shoes. After succeeding in photographing several of the more spectacular ones, I settled down in a comfortable chair and attempted to identify them. The first thing I learned about dragonflies is that it is difficult to identify them from a photograph. Entomologists ignore the distinctive markings and coloration of the insect, and focus their attention on the subtle differences in patterns of wing veination. To learn their identity, I had to go out and recollect the ones that I had already captured on film. At the ponds many different types zipped past me. They flew erratically, at varied heights, and in ever-changing directions. I had trouble catching even a few because of their speed and uncanny ability to escape each sweep of my net.

So the second thing I learned about dragonflies was that they are very difficult to catch. They ought to be; they have had over 300 million years to perfect their flight skills. In fact, dragonflies are one of the oldest groups of flying insects. The order Odonata had its beginnings in the Devonian period, a time when Paleozoic fishes, spiders and scorpions first cast themselves into the fossil record. It was during this time that the largest known dragonfly, *Megoneura monyi*, made its appearance. This species had a wing span of 2½ feet. Megoneus is calculated to have flown at speeds of over 40 miles per hour.

The intricate angular wing vane of dragonflies that entomologists use to differentiate species is simply the supportive structure that allows for the insect's aerodynamic agility. The slender body and placement and rotation of the wings reflect millions of years of evolutionary pressure. Scientists studying the flight of dragonflies have discovered that unsteady, separated fluid air flow caused by wing movement produces the lift needed for agility. This contrasts with the steady airfoil type lift produced by most aircraft, and quite unlike the lift of helicopters, bats, birds, kites, and other flying things that are familiar to us.

With their relatively simple geometric wing design, dragonflies possess a surprisingly large variety of flight modes. They include stationary hovering, slow hovering while moving in any direction, high speed flight, forward diagonal, and gliding flight. (Like the queen in chess, they can make all the moves.) The basic rotation of the wing tips is down and forward during downstrokes and up and rearward during upstrokes. Wing angles constantly change as much as 30 to 60 degrees, and during each stroke cycle produce a lift force of 15 to 20 times the weight of the insect. To further confuse a naturalist trying to guess where to position a collecting net, dragonflies operate their front and rear wing pairs independently. The next time you get a chance, watch a dragonfly in flight; it's truly unduplicated in nature or elsewhere.

Because of its ability in flight, this primitive group of insects has remained quite successful. Their original body plan must have been very efficient, for their overall appearance has changed little since Devonian times. Our modern subfamilies of Odonata appeared about the same time as the first birds. In fact, many fossil dragonflies have been recovered from the same lithographic limestone where the reptile-bird *Archaeopteryx* was found. Today there are more than 5,000 living species of dragonflies. For the most part they are tropical, and, of the 450 kinds found in North America, about 150 are found here in North Carolina.

While dragonflies are not as big as they were in Devonian times they are nevertheless a fascinating group of insects and deserve much attention. So it is hard to understand why people have not developed more enthusiasm for them. Yet you would have a difficult time finding a single person who knows even the names of the most common species. This is partly because not much has been written about dragonflies. Compared to butterflies, for example, there is really little information available in the form of field guides or other non-technical literature. Interest in this group seems to be limited to a small number of specialists. Still, even without the help of books there are many interesting aspects of dragonfly life which can be observed. In fact, because of their diurnal habits, biologists have found them to be excellent models for behavioral studies.

The best time to watch dragonflies is during their breeding season. Here in North Carolina this includes all but the winter months. In summer, large numbers concentrate around water. During this period the males can be seen racing back and forth over ponds and streams, establishing and protecting their breeding territory from rivals. It's almost like watching a prize fight. When one male is obviously

©JOHN SHAW

***A dew-covered** dragonfly wakes to another day. Dragonflies lay their eggs in water where the young live and grow as nymphs until emerging as winged adults.*

stronger or more experienced, the match is soon over. If the two males are of equal strength, however, the duel may last for many rounds. Each dragonfly tries to gain the lower position, resulting in spiralling, noisy clashes.

The territorial males also indulge in frantic charges and counter charges. At boundaries where neither has full domain they face off, eye to eye and nearly touching. These battles are usually a sham, and unlike situations when outsiders try to take over the domain, they never come to blows or bites. Typically the intruder gives up and flies away. After the male has reestablished his dominance in his corner of the pond, he is ready to begin courtship. Females are seldom seen. They live away from the ponds except for brief visits to mate and lay eggs. How they go about this provides good clues for identification. For example, common spotted skimmers (*Celithemis eponina*) often fly in pairs with the male grasping the female behind the head. He selects the places she will deposit her eggs. The combined flight is so strong that this species is often seen on windy days when other dragonflies are in shelter. The pair can be seen dipping eggs into the

Dragonfly Days

©JOHN SHAW

***Its four wings** poised, this common skimmer dragonfly is ready for instant flight. Dragonflies operate their front and rear wing pairs independently, giving the insect dramatic in-flight maneuverability.*

crest of small waves far from shore. Another example is the saddle bag dragonfly (*Tramen carolina*) which also flies in tandem, but the male unhitches between the dips when the female is actually depositing eggs, and hovers above her, then reunites and flies to the next site. The pair's tandem flights are functional; they prevent other males from intercepting females during the egg-laying process.

Females of most species, however, deposit eggs in solo flights, darting here and there, touching the pond or stream surface with the tip of their abdomens. With each tap she washes off small clusters of eggs. A few of the larger dragonflies go about egg laying quite differently. They deposit large single eggs. With an ovipositor that can puncture green plant tissue and even soft wood, they carefully plant each egg just below the water's surface in emergent vegetation.

It is quite important for males to stake out territories over proper habitats in order for the females to deposit their eggs in the right situation. The larval stages of dragonflies are quite specialized, with some having body shapes adapted for running streams, for swimming, or for burrowing in mud. Some are programmed for rapid growth in temporary pools where they have little competition but must emerge as adults quickly if they are to escape drying out. (A record time of six days from larva to adult is held by an Australian species.) For most species, however, the larvae have a comfortable three to six years to mature. Because of this the number of larvae accumulating in a given body of water can be phenomenal. A study in South Carolina showed the average annual density in a small farm pond to be about 1,000 individuals per square yard. Such concentrations of small aquatic predators must play an important role in the control of mosquito larvae and similar-sized aquatic animals. Larval mortality is naturally high, as they represent a major food source for game fish and they even prey on each

other. After the required periods, the larvae emerge from their aquatic homes and make one final molt into the adult dragonfly. Unlike more advanced insects, they skip the intermediate pupa stage, and within a few hours are on the wing.

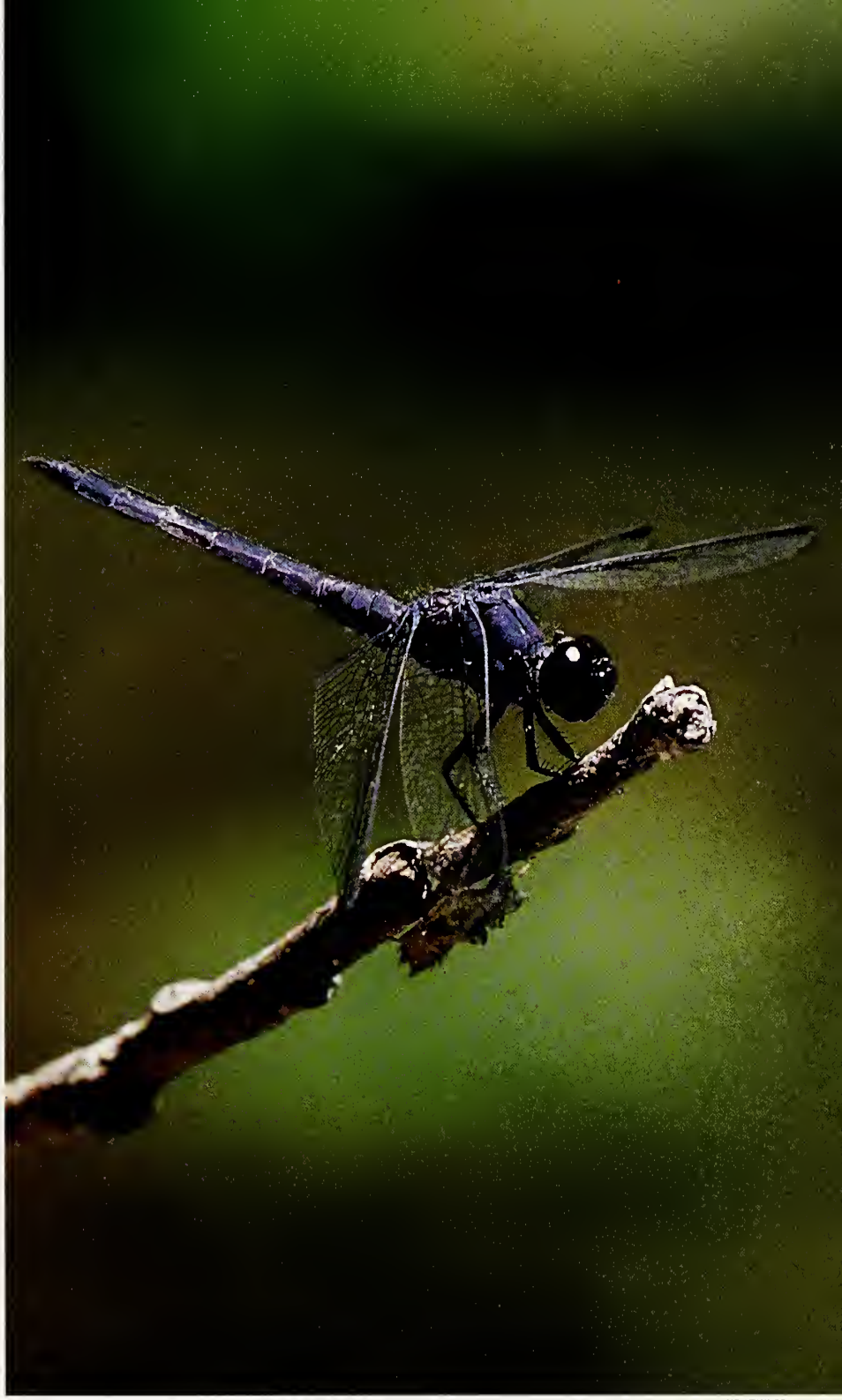
Adult dragonflies leave the site of emergence and feed over fields and other openings for several days to a week while their new exoskeleton hardens and the insects become sexually mature. The riddle of how they re-identify the proper aquatic habitat for stocking their next generation is revealed by their errors in judgment. Visual clues often are not reliable. River-breeding species, for example, may take up territory along country roads, where the opening in the trees and the road itself looks like river habitat. Other dragonflies have been seen guarding car tops that they regard as small pools. Nevertheless, most individuals manage to find the right habitat, and newly created farm ponds, for example, are colonized with larvae of many species the first season. In spite of wide wandering in the early part of their adult life, salt marsh dragonflies manage to return to salt marshes, and the stream dwellers to creeks and streams of the proper magnitude.

Perhaps the most notable wanderer is the globe trotter (*Pantala flavescens*). It is found throughout the world. Adults seeking temporary pools for their quick-growing larvae migrate with the winds. Eventually they arrive at the convergence of wind currents where large-scale precipitation is dependable. Thus, the adult globe trotters are not only in the right place at the right time to breed in newly forming temporary rain pools, but other individuals of the same species, delivered to the same region, assure that most will find mates. This particular dragonfly, compelled to migrate with the winds, is truly a world traveler, and I have often seen them 30 to 40 miles off Cape Hatteras heading for distant landfalls.

In flight some dragonflies are as easily recognized as birds, each group having its own peculiarities. The big darners fly in long sweeping curves and control the upper air spaces with their power and speed. The lesser ones keep close to cover and are much more agile and alert. Their postures, both in the air and at rest, the perches they choose and the angle each holds its wings are also good clues for identification.

Dragonflies are a bird watcher's insect, sporting subtle but reliable field traits, bright colors, and distinctive wing patterns. The only problem is there is no field guide, and no dragonfly-watching clubs. Each species needs to be learned on one's own initiative, and catching that particular orange, 3-inch, clear-winged dragon, distinctive as it may be, is often quite a challenge.

It's refreshing to have such an intriguing, colorful and taxonomically complex group of animals in our home state. Like mythical dragons, they have not been conquered, and even superficial attempts like mine to learn about these insects takes time and effort. Even today, it takes hardly any time for me to see some type of bug-eyed dragon I do not recognize, and before I capture it for positive identification I can do a lot of watching and learning. As the different kinds of dragons zip past me eyeing the sundry weaponry I concoct to capture them, I have the opportunity to perfect my patience and cursing skills simultaneously. By the time I master another three or four the season has advanced, and I am facing a whole new class. After eight summers of this I think I know about 25 of the 150 species found in North Carolina. Next May I'm going to get that one with the splotched wing down by the creek, and maybe if I'm lucky.... ⊠



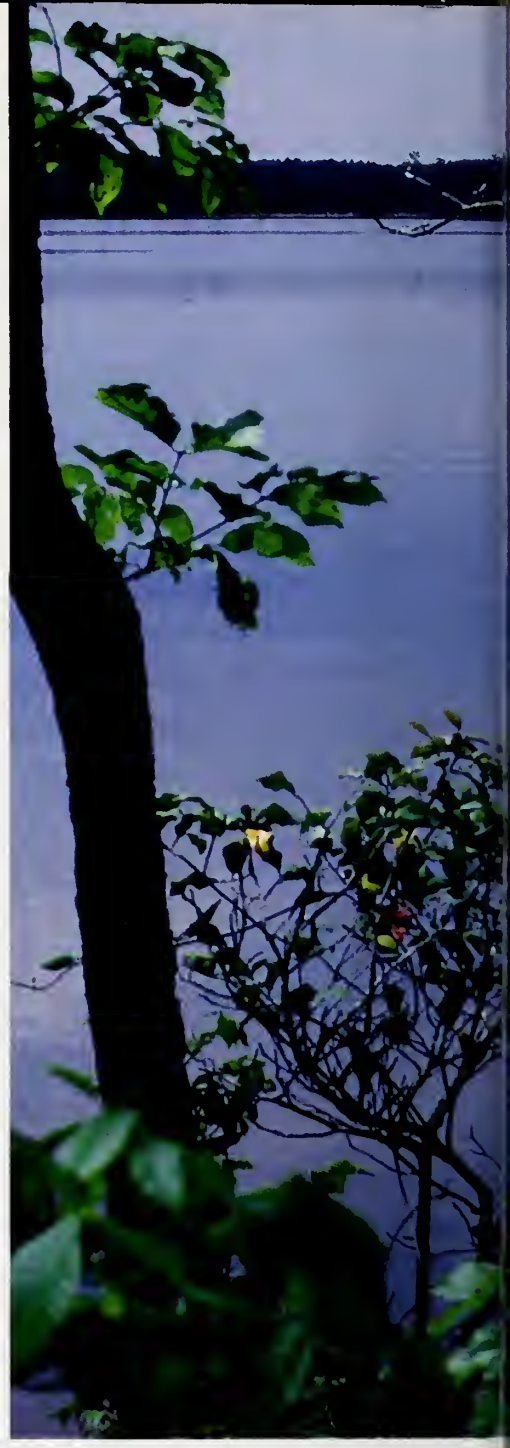
KEN TAYLOR

***Like its mythical** namesake, this skimmer appears ready to pounce. Both the nymphs and adults of these predacious insects are dragonlike in behavior, feeding voraciously on smaller insects and their larvae.*

BASS IN THE CLASS

When largemouth bass gather in schools, anglers may need to take a short course in tactics if they want to catch them consistently.

written and photographed by Pete Elkins



The first time was pure luck. The underwater point ran more than 50 yards away from the shallow, grassy shore before dropping into the main river channel. It had been a productive area all summer for plastic worms bumped down the channel ledge. I noticed the shad first. A skittering swirl here, then another and another. My purple plastic worm was half-rigged on the sproat hook when I saw a flouncing shad disappear in a foaming swoosh only a short cast from the boat.

Before my partner and I could cut off the worms and tie on small topwater lures, largemouth were tearing holes in the surface all over the point. We both hooked strong "schoolies" on our first casts. Bob landed his, but mine threw the treble-hooked plug in a dramatic pirouette. It didn't make any difference. One twitch of the rejected plug, and I had another bass hooked.

After I landed the follow-up bass, and Bob added another, the feeding spree ended. Only a few wounded shad marked the scene of the carnage.

I've since learned that this was a fairly typical surface-schooling experience with largemouth bass. Easy come, easy go. Fortunately, this encounter had an educational postscript. At the time, I had the rare luxury to be able to fish about any time I wanted. What would happen (I wondered) if I were back waiting at the identical point the same time the next day? I decided to find out.

The following morning I eased into range using the electric motor with my topwater rod ready just in case lightning struck again. It did. As before, a few nervous shad raised the curtain on what soon became some of the most aggressive largemouth surface feeding I've ever seen. Since no other boats were around to disturb the fish, they stayed on top much longer than they had on the preceding weekend day.

For five consecutive mornings during those late August days, I set my watch by the schooling bass activity. The only thing that seemed to change was that the bass became more selective as the week progressed, forcing a lure change that I'll mention later. The most important thing about the experience was the clear indication that schooling activity isn't entirely a matter of blind luck and, at times, can even be somewhat predictable.

Granted, luck still plays a role in where and when surface schooling action happens, but there are some things you can do to tip the blind lady's favor in your direction.

The time of year is the easiest guide to schooling prospects. For North Carolina anglers, the chances of running into a school of surface feeding bigmouths during the otherwise prime late February through late April period are remote at best. The same dismal situation exists for mid- and late winter. While this chilly period can offer some exceptional subsurface largemouth action, and even some of the year's best topwater striper opportunities, it's not the time to find largemouth feeding on top.

But opportunity often knocks explosively during the rest of the year, especially during the summer and into early winter. However, topwater action seems to cease when surface temperatures fall much below 58 degrees.

Bear in mind that we're talking about bass found in reservoirs and large rivers where the dominant forage species is threadfin or gizzard shad. All bets are off in farm ponds, where different rules apply.

Little actual surface schooling takes place in ponds. It's just not a schooling situation although an angler is apt to catch a bucket-mouth on a topwater plug most anytime in a pond, even during an unseasonably sunny January day.

Opportunities to catch schooling bass seem to vary markedly from one lake to

another. There are some Carolina lakes where surface schooling rarely occurs even under otherwise perfect conditions. Don't ask me why. Other lakes are well known for good schooling activity. For example, all of the Yadkin and Pee-Dee system impoundments offer relatively reliable schooling action, especially during the autumn and early winter months. Big Lake Norman provides exciting topwater fishing for bonafide schoolies in the 10- to 13-inch range throughout the schooling period.

As a very general rule, surface feeding largemouths are not very large. Most surface feeding schools consist of 1- to 3-pound fish. Still, there can be surprises. On several memorable occasions, I've seen schoolies averaging almost 4 pounds, but don't count on that happening more than once or twice in a lifetime.

The size and concentration of schooling topwater largemouth is about the same as those you catch while vertical jigging during the winter months. I suspect that the schools that provide that exciting surface action during pleasant weather are the same schools that nip Hopkins spoons on submerged high spots and ledges when it's cold.

How do you catch schooling topwater bass with any degree of consistency? The big "secret" is to be there when the bass come up. That's like saying, "It takes money to make money." The easiest way to be there at the right time is to first luck into some

***From mid-summer** through the fall, bass in large lakes often school up to chase shad, especially on calm, overcast days or in early morning or late afternoon. At such times, fishermen may see schools of shad rippling the surface, along with the swirls of feeding bass. Anglers can often catch the bass using small surface lures, spoons and jigs.*

schooling action, then have the good fortune to be able to return to the same place the next day.

Every time that I've been able to fish the same patterns more than a few days in a row, the fish have always cooperated so long as weather conditions remained relatively undisturbed. Unfortunately, most of us don't have the ability or luck to be able to fish more than a day or so every week if that much. If so, what then?

Remember those winter spoon-jigged largemouths taken on submerged ledges, sunken islands, and underwater points? That's where a lot of the warmer-weather schoolies are too, just waiting for shad to announce that it's party time. Find the right submerged bottom features, add shad concentrations, and keep your fingers crossed for low light conditions. Low light is — after the presence of shad — the dominant factor in schooling predictability. Normally, low light exists in early morning or late afternoon, but overcast days afford the same opportunity. The lesson is unavoidable: the early arriver has the best chance to catch schooling bass. Let the plastic worm bunch sleep late, secure in their knowledge that they will catch just as many bass during the middle of the day. They're right, but they're not looking for the same action we are.

As noted, lakes vary significantly, and some waters produce prime first-light schooling activity while others are at their peak in late afternoon or at dusk. My favorite lakes offer both early and late opportunities, but in either case, be there waiting at the right time.

If a fishing genie materialized from my tackle box offering the best conditions for schooling action, I would pray for a darkly overcast day with enough wind riffle to ease a bass's paranoid soul. I'd also want a fast boat, an uncrowded lake, no backlashes, and no appointments to keep. Overcast days can create dawn-to-dusk surface feeding with schools of shad rippling the top and largemouth coming up after them.

There's a dark side to surface fishing for surface schooling bass beyond even the difficulty of being at the right spot at the right time. Sometimes, the bass are simply downright hard to catch. They may be tearing the surface apart — shad and pieces of shad are everywhere with bass in hot pursuit — but the fish will ignore everything in your tackle store.

If you look closely, however, the solution is usually apparent. Those shad skittering in panic across the surface are probably only an inch or two long, significantly smaller than the lure you're using. If it's still summer, immature shad from the spring spawn will make up the bulk of the forage schools. The first rule is to change to a smaller lure. If that still doesn't do the job, go smaller yet. It may also help to think transparent thoughts. An example comes to mind.

Schooling largemouth *rarely average more than 2 pounds, and the shad they're feeding on are also small. Most fishermen use lures that are too large. Above is a selection of several lures the author favors for schooling bass.*

It was a late summer day on the Yadkin River impoundment, and I was about as frustrated as an angler can get. There wasn't anything frantic about the activity except my casting, but every five minutes or so, a decent bass would snatch a shad from the large concentration of bait nervously rippling over the creek channel ledge in about 25 feet of water. After a hundred or so futile casts and almost as many lure changes, I finally found the right combination: a transparent, clear Heddon "Tiny Torpedo," a lure I usually reserve for river smallmouths.

The shad were tiny, and the short, clear topwater lure seemed to mimic them perfectly. All it took was a quick cast to the vicinity of a surface swirl, a few water-spitting twitches of the lure, and a chunky bass would take charge. Clear lures are effective because they provide adequate casting weight appearing to be smaller than they actually are, therefore suggesting small shad. Few lures can match the Tiny Torpedo for such trying times. Other good topwater choices include the Rebel Pop-R and Cordell's transparent Near-Nuthin plug. The latter is a weighted plug which, while very short, can be cast into the next county. Schooling largemouths present one of the very few situations in freshwater fishing where casting into the next county is almost as important as accuracy.

When bass are being really picky while feeding on tiny shad, a bizarre lure combination is sometimes highly effective. This lure combo is more at home in a salt water sea trout marsh than a lake, but schooling largemouth sometimes go crazy over it. The rig is nothing more than a weighted popping cork trailed by a short 12- to 18-inch mono leader with a popping bug attached. Any popping bug would probably suffice, but the standard for me is the "Thing" popper. This rig was designed for hybrids, and produces best for largemouth bass when retrieved with subdued rod action and lengthy pauses.

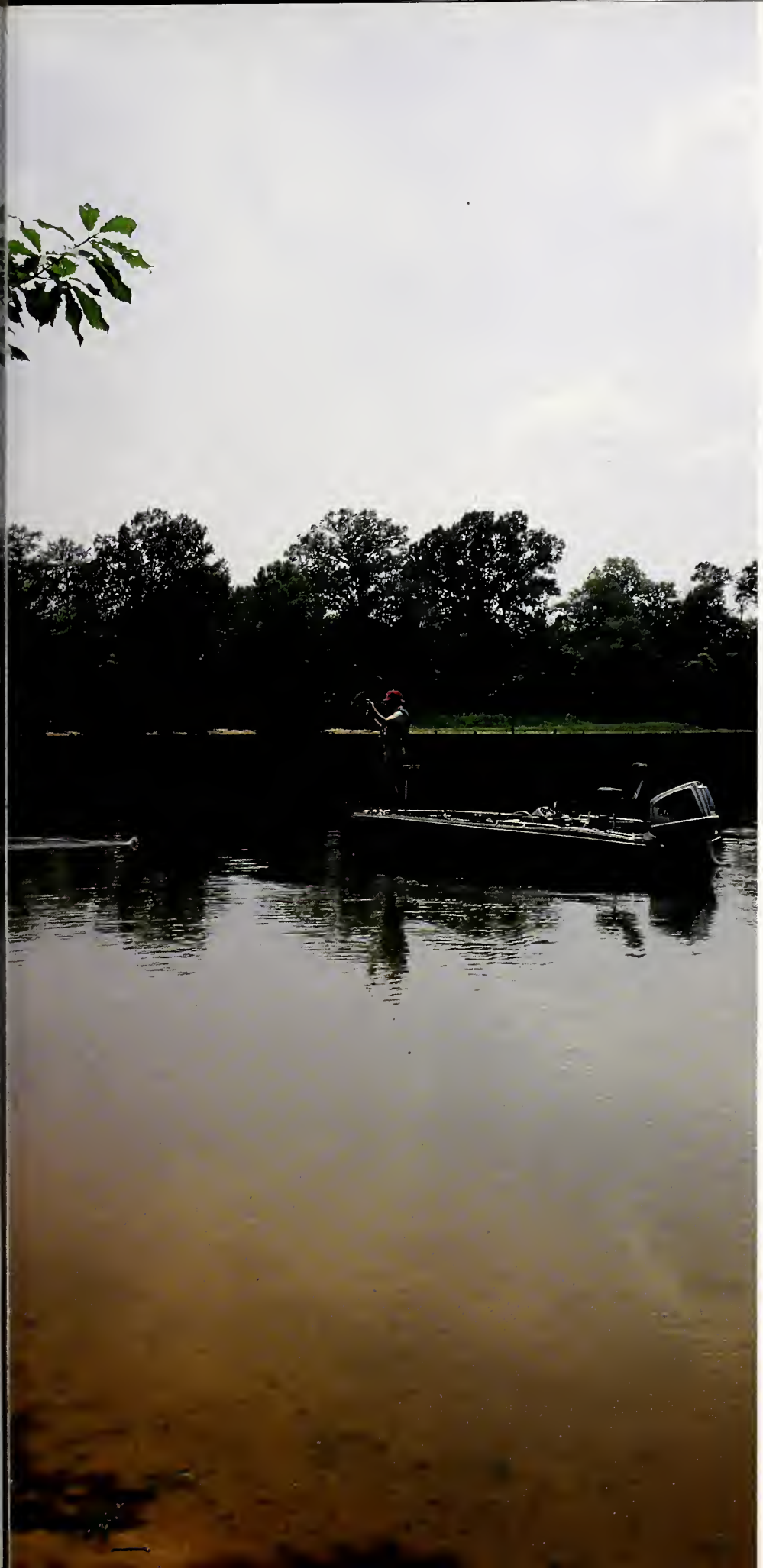
The beauty of the rig is that it casts a small, almost weightless lure a long way, and produces a beguiling surface commotion that will sometimes bring bass back up after the surface action has calmed.

Another excellent tactic is one western bass anglers use to fish clear, deep impoundments. These involve the use of plastic, multi-legged tube jigs like the "Gitz-It." Another good choice is the "spider" type jig, also of western descent, though now manufactured by a lot of folks. One of the favorite Carolina versions is the "Creepy Crawler."

These plastic lures are superb for schooling bass, especially in colors like smoke, clear-sparkle and similar transparent tints that imitate shad. I like to cast these lures beyond the schooling action, begin a slow actionless retrieve, and then let the lure fall through the school on a tight line. Watch the line for the twitch that signals a strike.

When schools of bass are coming up fast and going back down just as fast, I reach for a ¾-ounce Hopkins spoon. In fact, if I could have but one lure for schooling bass, this would be my choice. It casts forever, yet can be retrieved slowly or more rapidly just under the surface. When you stop your retrieve, it drops with a flutter. I like to cast well beyond the surface melee, and reel as rapidly as possible, literally skittering the spoon across the surface. When the lure reaches the center of bass mass, I stop everything, but maintain a tight line. The spoon won't fall far before it gets hammered.

Tackle choice will vary depending on preference, but you want something that will make long casts, and light spinning tackle is my choice. There's no need for heavy tackle since most schooling action takes place in relatively uncluttered water, and heavy mono can cost you strikes in clear water. Lighter line also handles small lures and long



***This angler** is landing a bass he hooked while fishing over schools of threadfin shad he'd spotted rippling the surface. When you see signs that larger fish are feeding on these shad, you may be in for some fun. Those predators may be largemouth bass, but they could also be white bass, hybrids or even stripers.*

casts. Light spinning gear with 6- to 10-pound line is also perfectly matched for casting one of the most reliable of all schooling bass lures — a small 2- to 3-inch plastic curly tail grub. Few bass can resist a smoke-sparkle colored grub when they're dining on small shad. The trick is to get the grub to the bass quickly after spotting the fish.

Some anglers actually wait for schooling action to begin. Truly, they actually sit there, rod in hand, waiting for something to happen. More power to such patient fishermen! I just can't do it unless it's one of those all-too-rare times when I can string a few fishing days back-to-back, and know pretty well where and when to expect surface feeding bass to appear. More often, I simply keep an "opportunity" rod rigged with one of my favorite school bass lures at all times. If bass have been schooling in a particular place with any regularity, I'll fish a plastic worm or crank bait in the general vicinity until the bass begin to feed on top.

Once the surface action begins, however, it is a bad idea to make random casts. It pays to wait until you can target a swirl that denotes a feeding fish. If a bass breaks on top 30 feet to your left, and you've just cast 70 feet to the right, even the fastest retrieve reel will seem slow.

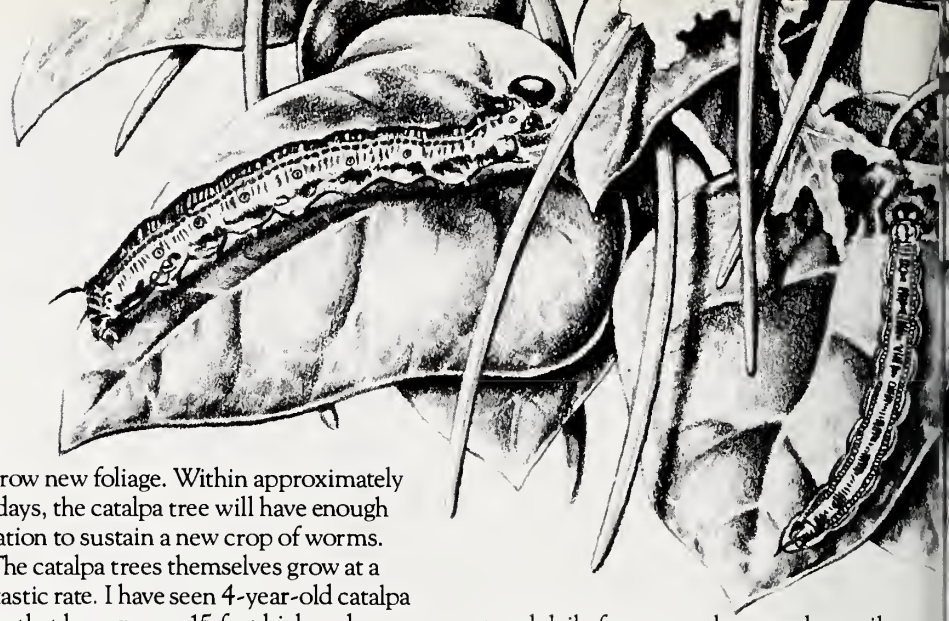
Largemouth display a distinctive feeding pattern on top, readily discernible from that of stripers or white bass. Stripers make a lot of noise and throw a lot of water. White bass are much quieter, but generally cover a wider feeding area. Whites are also "splashy" with a fast, choppy feeding pattern. Largemouth are usually in smaller schools than whites, and don't make a lot of noise. However, larger bass tend to swirl on top more like winter stripers and smaller school bass can be mistaken for white bass.

Surface-schooling largemouths are often frustrating, sometimes unpredictable, but always exciting. Some Carolina anglers get that faraway look in their eyes at the prospect of a summer day, a cooler of chilled refreshments, a tackle box full of purple worms, and a productive channel ledge. As for me, I'll take some smoke grubs, a few topwater plugs, a handful of Hopkins lures, an overcast day (a little rain wouldn't hurt), and a school of hungry largemouth bass.

THE FISHING TREE

Money might not grow on trees, but the world's best bait for bluegills and shellcrackers does.

by Hal Porter
illustration by Jimmy Brown



If you've ever visited the Palace Green in Williamsburg, Virginia, and admired its stately rows of shade trees, you've seen the southern catalpa tree (*C. bignonioides*). It's well-known among horticulturalists as a tree that generally grows 15 to 30 feet tall with numerous leafy branches, heart-shaped leaves, and upright clusters of white, spotted flowers that bloom in June. But among fishermen the catalpa tree is equally prized for producing a mouthwatering bait that freshwater fish love to eat.

The catalpa tree provides the nourishment for the growth and development of the catalpa worm, a 3-inch caterpillar similar to the tobacco worm. The mature worm can be identified by its distinct coloration consisting of horizontal green and black stripes, and is a favorite food of panfish, bass and catfish.

By the time they attain full size, the worms have devoured all the leaves on the catalpa tree and travel down the tree trunk to burrow into the earth. While in the ground, they enter their pupal stage of development, which lasts for about a year. The following summer, the catalpa emerges as a butterfly and lays hundreds of eggs the size of a mustard seed on the underside of the tree leaves. This usually occurs during the waxing of the moon, just before it becomes full. Within several days, the eggs hatch and can be seen as tiny white worms. As they devour the green fiber of the tree leaves, both their body fluids and skin are stained by the chlorophyll contained in the leaves. The hungry nymphs increase rapidly in size and are normally fully grown within two weeks of hatching.

After the leaves have been eaten and the worms depart, the tree immediately begins to grow new foliage. Within approximately 30 days, the catalpa tree will have enough foliation to sustain a new crop of worms.

The catalpa trees themselves grow at a fantastic rate. I have seen 4-year-old catalpa trees that have grown 15 feet high and better. The trees provide excellent shade in a very short period of time and can be easily transplanted. If moved properly, a 75 percent or better success rate can be expected. After the trees are established, it is virtually impossible to get rid of them.

The tree appears to grow best in heavy soil — dark loam, silt or clay, but it can survive anywhere. The sandhills of Bladen County, which sustain little more than pines and black-jack oaks, can produce beautiful, healthy catalpa trees, although they do not grow as fast as their cousins that live in the dark soil of Pender County. There is even one on the bank of the Cape Fear River below Elwell Ferry in Bladen County. Area fishermen can almost pick bait from their boats when the tree has worms.

A little-known fact about catalpa trees is that they require initial priming — as would an old pitcher pump. I have heard tree owners complain about not having worms because they didn't have "male and female" trees. This isn't the cause of the tree's infertility. When a tree sprouts in a new area, worms must be placed on the tree in order to harvest subsequent crops of worms. Trees that have never had worms probably never will. But a dozen half-grown worms introduced to a tree will provide offspring for that tree and other trees in the area for years to come. Just remember, out of each harvest of worms, allow a few to remain on the tree "for seed."

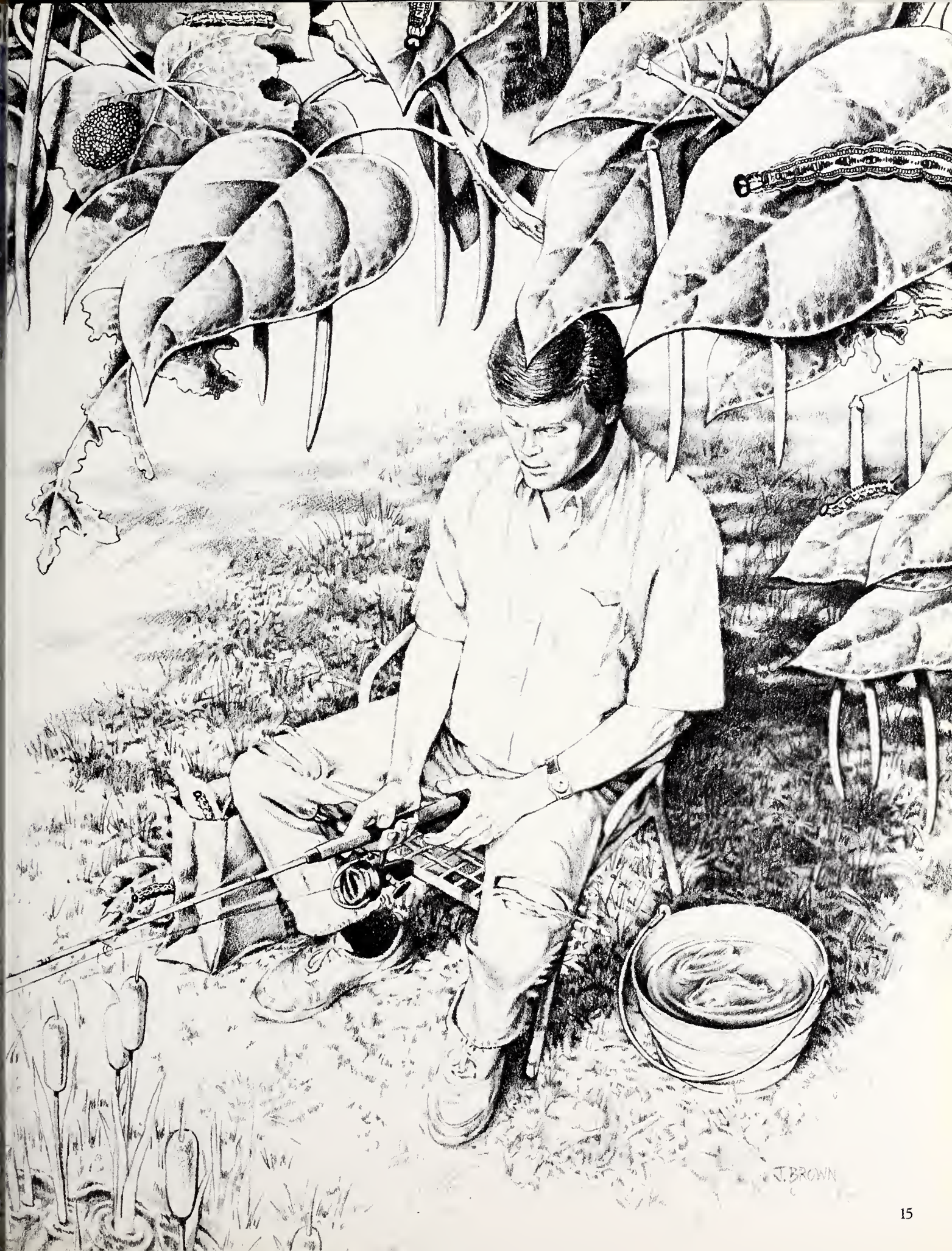
The trees also produce foot-long pods of "beans" which serve as their reproductive organs. As the pods open in the fall, their contents float earthbound and the following spring, germinate new trees. When these volunteers reach 2 to 4 feet in height, they become ideal candidates for transplanting. Large volunteers can be transplanted, but their mortality rate increases. When transplanting, the new trees should be watered daily for two to three weeks until new growth is detected. Afterwards, Mother Nature will do the rest. Annually, during the winter months, the trees should be fertilized with commercial fertilizer or compost until they reach 10 or 12 feet. At this height, additional fertilization is unnecessary and the limbs can be pruned periodically to reduce the effort required to harvest the worms.

When fishing with catalpa worms, cut the caterpillar in two or three pieces. I prefer to halve the worm, but if the pieces are too big, the bait can be pulled from the fish's mouth without setting the hook. A worm's skin is very tough — one worm can be used to catch as many as five to 10 fish. Some fishermen believe it improves the appeal of this bait to turn the worm inside out on the hook. Almost any freshwater fish likes this bait — catfish, bass, bream and crappie are all tempted by these slimy morsels.

The catalpa worm makes an excellent alternative to crickets and earthworms. In the Coastal Plain, fishermen pay as much as 20 cents per worm for them, attesting to the favor they enjoy with area sportsmen.

Worms that aren't used on the first fishing trip can be stored in the refrigerator for two to three weeks without detracting from the bait's appeal to freshwater fish.

Considering that these beautiful trees provide fast-growth potential, good shade and fresh bait, and are adaptable to almost any climate or soil type, they could easily become every freshwater fisherman's friend. ⊠


J. BROWN

Keepers *of Our* Maritime Past

Old salts and young ones will love the North Carolina Maritime Museum in Beaufort, where the history of our nautical past is handsomely preserved. But there's more to the museum than its displays.

by Jim Dean
photography by Ken Taylor

A visitor's first impression of North Carolina's Maritime Museum is how much it resembles many of the early white-trimmed, shake-sided U.S. Coast Guard stations that have been prominent fixtures along the Outer Banks for so many years. That is no accident, of course. Sitting just across Front Street from Taylor's Creek in Beaufort, the 18,000 square-foot museum, completed in 1985, continues a celebration of North Carolina's rich maritime history that began in 1951 in a small side-street building that was then called the Hampton Marine Museum.

Inside the new museum building, the link with history is even more apparent as some 200,000 visitors annually are greeted to a dazzling display of ship models, nautical artifacts, historically important hull designs, natural marine history displays and salt-water aquariums with live species of fish found in the ocean and estuaries on our coast.

On this spring morning, one of the museum's volunteer tour guides, Bob Hompesch, has just begun introducing a class from Jackson Middle School in Greensboro to our maritime heritage. As the students gather around an old, chest-high brass binnacle in the lobby, Hompesch explains its purpose.

"This is not R2D2," he says, noting the ship's guidance system's resemblance to the Star Wars' character. When the laughter dies, he continues. "The binnacle contains the compass and other navigation instruments to keep a ship on course." As the class moves on to the next stop, one intrigued student straddles the binnacle like a video game. One wonders if he, like so many other visitors, is imagining himself at the helm of an early sailing ship, heeled over on a reach under the Southern Cross, driven by the trade winds to some strange and distant port. Or is he merely looking for Pac Man?

Farther along, the class stops at the weathered wooden hulls of two early North Carolina work boats, both driven by sail, each examples of early designs originated for seaworthiness in the shallow shoalwaters of our coast. In glass cases nearby, ship models realistic enough to go to sea crewed by inch-tall sailors display other designs that were important links in our maritime history.

Displays of nautical tools, artifacts and photos chronicle North Carolina's commercial fishing, and there are tanks that contain many of the species sought by those fishermen.

Frank Gaskill draws a crowd. He always does. Sponsored by the Friends Of The Museum, he sets up shop at a desk in

***You needn't be** a marine scholar to appreciate the museum's displays of early North Carolina boats, models and nautical paraphernalia. Anyone who loves the coast and its close association with the water and boats will find these displays fascinating.*

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***The relatively** new museum building reflects the architecture of North Carolina's early U.S. Coast Guard stations. Already filled to overflowing, the museum is adding a Watercraft Center, offices and a field-trip departure dock on the Beaufort waterfront.*

the museum each Monday where he builds incredibly accurate models of the ships that forged our past. Today, he is working on the hull of a Bermuda sloop, a single-masted coastal trader from the 1740s. But rather than build the hull from a solid piece of wood, he has constructed this one in exactly the same way early shipbuilders would build the real thing. Using miniscule tools, he has laid the keel, added the ribs and bulwarks, and planked the hull with individual strips held by tiny wooden pegs. The strips are birch, the pegs are the tips of round toothpicks. At the moment, he is painstakingly laying each deck plank.

Gaskill picks up the hull of another nearly-completed model to show the class. "Ever hear of Otway Burns and the *Snapdragon*?" he asks. Several members of the class nod; they have seen Burns' grave in Beaufort earlier in the day.

"Otway Burns was the nation's most successful privateer during the War Of 1812, and he's from Swansboro right down the coast from here,"explains Gaskill. "This is his Baltimore clipper, the *Snapdragon*. Operating out of Beaufort, he and his crew of local sailors captured more enemy shipping than any other privateer. His story would make a heckuva movie."

When completed, Gaskill's models of Burns' ship and the Bermuda sloop will join others in the museum, many of them made and donated by the late John McCormick, a retired ship's captain from Davis.

Among the many models is a particularly impressive 10½-foot model of a commercial wooden menhaden boat presented to the museum by the late Evelyn Chadwick Smith, a major benefactor of the museum and widow of the late Harvey W. Smith who founded one of the biggest menhaden fisheries in the world in Beaufort. Employees of Smith's shipyard built the model in 1947 on days when the weather was too nasty to work outside on the real thing. It's an exact replica of the larger boats.

While models and displays are the most visible functions of the Maritime Museum, they actually comprise only a part of the

***Live fish** in the museum's salt water aquariums attract a lot of attention (above), and also serve to introduce visitors to a variety of research and educational programs that include field trips to seashore habitats. Each Monday, museum volunteer, Frank Gaskill (left), builds authentic models of ships that have played a role in North Carolina's maritime past.*

museum's many services and directions. One of the most unique was inspired by Charles McNeill, a local waterman, sailor and artist who guided the museum as director from 1975 until his retirement at the end of 1987. Prior to 1975, the museum was open part-time during the warmer months almost entirely through the faithful efforts of curator Ruth Deyo. McNeill's lifelong fascination with boats and the sea led him to the U.S. Merchant Marine Academy and subsequent years sailing to exotic ports-of-call. It was McNeill who presented Agriculture Commissioner, James Graham, with a proposal to expand the museum.

It was also McNeill who set up a program of unusual services for the many sailors, both amateur and professional, who pass through Beaufort's port.

"The service that attracts the most attention is undoubtedly our loaner car, presently a rusty 1971 Chevy Malibu,"said Jane Wolff, director of public information. "It looks pretty bad, all the more since its original color matches the rust, but it runs. We loan it to passing boaters so they can get around to buy food or other supplies. It's part of our spirit of a by-gone day, and it's very popular."

That's not the only valuable service to mariners. The museum maintains a mail drop for boaters, a valuable research library, and serves as the largest source of navigational charts and nautical instruments between Washington, D.C. and Miami.

In a cluttered office alongside the museum's main gallery, another key step in preserving North Carolina's maritime history is taking shape. Michael Alford, curator of maritime research, is writing a book to be published by The University of North Carolina Press on the history of many types of boats developed and used in this area. (See "Traditional Boats Of North Carolina," by Mark Taylor, July, 1984.)

"Until recently, we knew very little about early boats in this region — the sharpies and shad boats, for example," said Alford. "Boats are tied to the ecology and natural history of an area because they use native materials like live oak, cypress and juniper."

Alford's research is tied closely to the work of another museum program, the reconstruction of modern full-sized replicas by Geoffrey Scofield, who joined the staff in 1978. One of Scofield's creations is the 24-foot ship's boat for the replica of the Sir Walter Raleigh era ship, *Elizabeth II*, now on display in Manteo. The museum also sponsors the highly popular annual Traditional

Each spring, *the museum sponsors a festival in Beaufort that honors traditional wooden boats typically used in North Carolina (right). Many are replicas of sharpies, spritsail skiffs and other early work boats, but some are originals that have survived the onslaught of time. Displays inside the museum trace the history of commercial fishing and boating (below).*

Wooden Boat Show each spring in Beaufort.

Perhaps most important of all the museum's many roles are its vast and varied educational programs that include field trips to seashore habitats, aquarium programs, underwater archaeology, week-long, half-day summer science classes — even an introduction to surprising seafood dishes. Held the third Thursday each August, the Strange Seafood Exhibition gives ticket holders a chance to sample such odd foods as bluefish mousse, mole crab chowder, stingray casserole and squid salad — all quite edible, some delicious.

"We're not just a maritime museum, but also a natural history museum that takes a strong role in research and education," said Joanne Powell, curator of education, who oversees a staff that includes staff botanist Jeannie Kraus, and Patricia Hay who is in charge of the aquarium. "We lead field trips to visit tidal flats, salt marshes, spoil islands, pocosins, fossil sites, boat builders, decoy carvers, and take groups offshore on trawler trips, to name just a few. We teach the life cycles of marine plants and animals, take birding trips, and even show how carnivorous plants get nutrients."

You can quite literally plan your vacation around the museum's myriad programs, and many families do just that. A glance at the museum's calendar reveals a staggering array of fascinating opportunities.

Much of this is possible, according to Museum Director Rodney Barfield, because of the substantial support of the Friends Of The Museum, a nonprofit organization that augments the state's services by providing not only financial help to purchase expansion property, but also such services as volunteer guides, Gaskill's Monday modeling demonstrations, and even the loaner '71 Malibu.

Barfield sees three main parts to the museum's present role and, along with help from the Friends group, credits the museum's success to excellent support from the agency that governs it, the N.C. Department of Agriculture.

"Our first goal is to make the maritime and natural marine heritage of the state accessible to the public through both interpretation and education," said Barfield. "We conduct over 300 educational programs, lectures and field trips each year.

"Second, we must collect, document and display artifacts that demonstrate this heritage," he said. "That's where the models, nautical instruments and traditional trades like commercial fishing come in. Service to

***This magnificent** 10½-foot model of a menhaden boat in the museum lobby always draws an admiring crowd. The model was built in 1947 by workers in a local shipyard on days when rain prevented outside work on the larger menhaden boats.*

passing mariners is the third part."

For Barfield, there is another highly important goal, one that is somewhat more difficult to control. "We want to help preserve the traditional culture that is part of this region and so closely connected to the estuaries and sea," he said.

"In the mountains, a lot of energy and money has gone into preserving earlier lifestyles, and that's good," he continued. "But in some cases the genuine article got left behind. The old songs were cleaned up, the crafts changed, and some of the true mountain ways were obscured. That's why we're collecting the authentic coastal work songs as they existed. We're trying to save examples of the language, tools, daily life styles and anything else that can keep us in touch with the way it really was."

For the future, Barfield also sees an expanding role for the museum, and would especially like to see it serve in a leadership role for other similar museums. "We will sponsor the South Atlantic Regional Maritime Conference next March, and one of our goals is to advance the academic role of museums in workshops and forums," said Barfield. "Mike Alford's book is an example, and so is our leadership role in underwater archaeology."

Already, the new museum is bursting at the seams, having outgrown its building. Across Front Street on the waterfront, the museum will build a Watercraft Center to house the building of life-size replicas of old boats. At Harborside next door, museum offices will be installed as part of a renovation, while field trips will leave from the dock in front.

"It's coming together," muses Barfield. "We need another storage building, but that's in the works."

Back at the museum lobby, a second group is beginning the tour. Lingering behind, a youngster stands before the brass binnacle. He braces his legs as a large swell buries the rail. As icy water pours through the scuppers, the ship rights itself to face yet another green wall. Cape Horn's in its usual ugly mood today, he thinks as he wipes the spray from his face, but we'll make it. ⊠

Pompano In The Surf

These small members of the jack family are common along our coast in summer and early fall. Here's how to catch and cook what will surely become one of your favorite fish.

written and photographed by Joel Arrington©

Ocean breezes moderate North Carolina's late-summer weather along the coast. Influenced by a high-pressure system centered near Bermuda, southwesterly winds predominate, but July and August mornings generally dawn calm or they bring, at most, soft offshore winds. By noon a gentle sea breeze has come up, holding afternoon highs to the eighties.

Appropriate attire for the vacationing angler is a T-shirt, shorts and bare feet. Unencumbered by soggy sneakers and long pants, the summer surf fisherman is liberated to probe the sea's green margin for whatever it may yield. Though summer is generally regarded as a poor time for surf fishing, it can produce Spanish mackerel and small bluefish in good numbers as well as a variety of small bottom fish.

Into this environment migrate the little gold-tinged, platinum-sided jacks we refer to as the Florida pompano, the fish that consistently fetches some of the highest prices per pound of any in U.S. markets. Florida pompano is the common name attached to *Trachinotus carolinus* because that state is the commercial source of most of them. But when the great Swedish taxonomist, Karol von Linné, first described the species in the 18th century, he gave it a name that reflected its migrations along the Atlantic coast. Pompano venture as far south as Brazil and as far north as Cape Cod, but are uncommon north of Virginia. They also appear at Bermuda, in the West Indies, and in the Gulf of Mexico where, at New Orleans, Creole chefs learned to cook them in paper envelopes — *en papillote.*

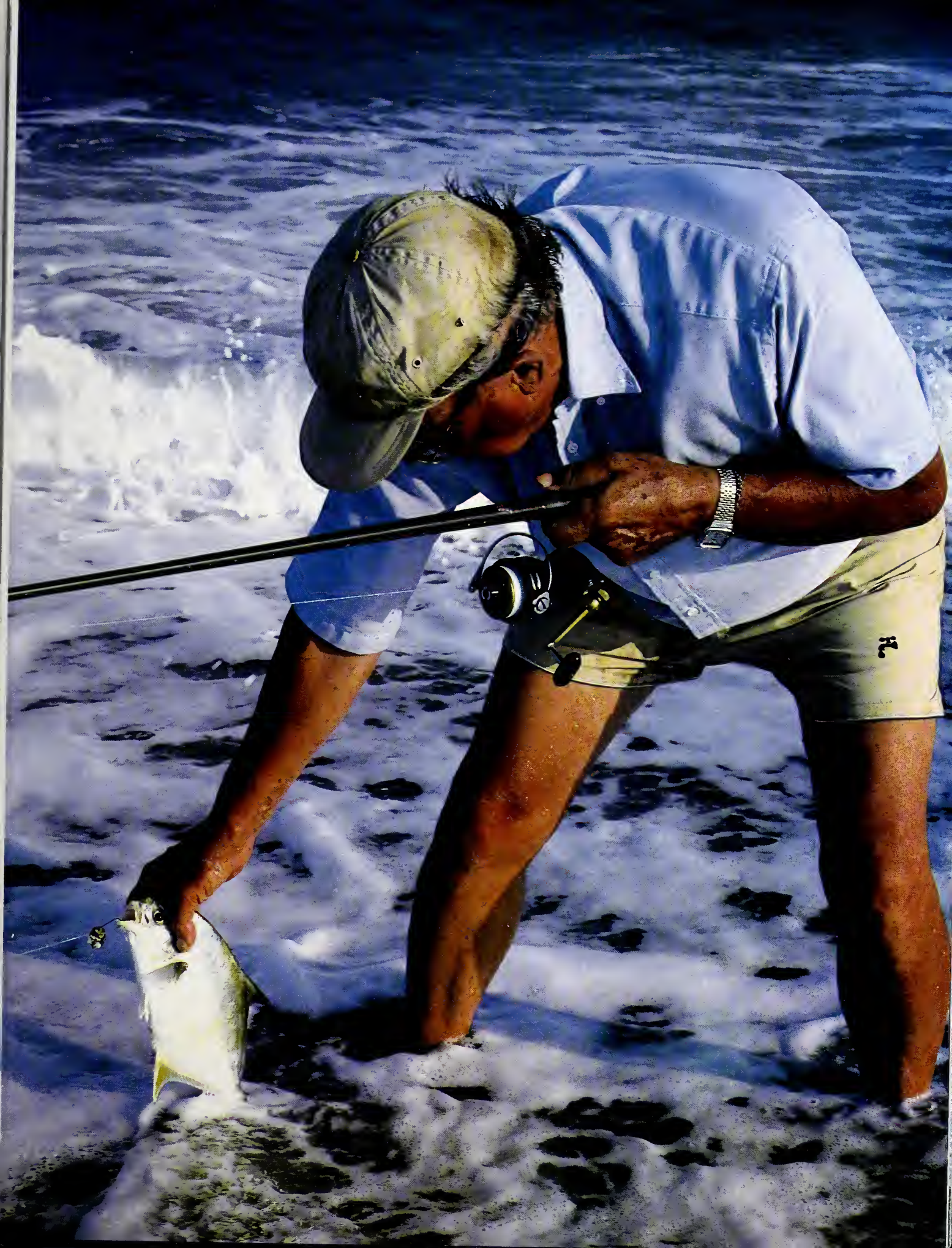
In the North Carolina surf zone and inshore waters, pompano are commonplace in late summer. The first usually arrive in late June on the southern coast, and in July at Cape Hatteras. These early arrivers tend to be bigger — often over 3 pounds — than those of the later main run which average less than a pound. So pompano are bantamweights at best, but, like all members of the jack family, they give a good account of themselves. Unlike most other jacks, these are more than just good to eat. Epicures rave over the firm, rich flesh, enhancing a reputation that accounts for the premium price.

Anglers commend their game qualities as well. Dan Holt of Carolina Beach remembers when he used to catch them with a cane pole, a sinker and a piece of shrimp. "They were right under our feet," he said.

Holt pointed out that pompano had been almost totally absent from Cape Fear waters for several years, but that they had returned and he was among the many who had been catching them lately in the surf. "Two years ago, they were thick here," he said. Holt baits with shrimp, disliking having to dig sand fleas, and says he usually catches three or four to a half dozen pompano on a trip to the surf — about all he and his wife, Margaret, one of the Cape Fear region's notable cooks, can eat with guests.

While fresh shrimp is good bait, mole crabs are probably better for pompano. Also

***When schools** of pompano invade the surf in late summer and early fall, anglers can often catch them under the shore break using light tackle. Larger pompano, weighing up to several pounds, are more likely to be caught farther out near the sand bar.*



called sand fleas or sand bugs, the small crustaceans can be seen digging in as waves wash back over them in the summer surf. Some type of sieve is useful in digging them, like half a galvanized wire minnow trap. Often you can dig them with your hands right where you fish. Like other crustaceans, mole crabs shed periodically and are soft and vulnerable for several hours. These soft crabs are good baits, but they are not without problems.

Ben Doerr, a surf guide at Avon, on Hatteras Island, worked out a method of catching the bigger fish that tend to work bars off the beach rather than in the wash. He said that he used to see those fish in clear water sometimes while he was fishing close behind the curl of the waves breaking on the beach. But, following conventional wisdom that recommended ultra-light rods and soft baits, he was unable to catch them.

"I couldn't reach the bar casting enough weight to hold bottom," he said, "and the soft sand fleas would just sling off when I tried to cast that far. If they by chance stayed on, bait-stealers like croakers and bluefish would always take them right away. Everything loves a soft sand flea."

A practical man and innovative angler, Doerr moved up to an 11½-foot graphite surf rod, one that would throw a 3-ounce weight 100 yards, but he kept the light line—8- or 10-pound test. Only then could he reach the bigger fish that held off the beach, but to catch them he had to switch to hard-shelled sand fleas.

Hard mole crabs stay on the hook during a cast and they resist nibbling bait stealers like small fish and crabs. "But a big pompano will eat a hard sand flea in a heartbeat," Doerr said, "especially if the fleas have eggs." Mole crabs carry their orange eggs in a soft matt under their tails, like blue crabs and other crustaceans. Doerr simulates eggs with a fluorescent orange bead on his hook shank whether he can find egg-laden mole crabs or not.

Terminal tackle is the everyday double wire bottom rig sold in coastal tackle shops. Doerr modifies his rigs by adding #6 Bear Paw gold spinners ahead of #5 to #8 long-shank, thin wire hooks. With a tight drag and line heavier than 10-pound test, these hooks will straighten, but they fit nicely into Doerr's system of light line

***Most anglers** believe the best baits for pompano are mole crabs (also called sand fleas) that can be scooped out of the wet sand in the backwash of a wave. You can use your hands to catch these harmless baits, but a wire sieve is more effective.*

Pompano Cookery

In the market, pompano run 1½ to 2 pounds, but anglers sometimes get them up to four or five pounds. For each diner, count on two medium-sized fillets or one whole fish. For the smaller pompano that average a half pound—typically caught inshore under the wash—a hungry diner may be able to eat half a dozen. Like Spanish mackerel, pompano do not need to be scaled nor skinned. Small fish may be headed and gutted, larger ones filleted.

The simple approach is to broil fillets, brushing with butter and sprinkling with lemon juice. You may hold fillets in a hinged rack and broil over coals, also brushing with butter and lemon. Either way yields delicious fish. Diners with a Mediterranean taste for olive oil might substitute a fine grade.

A. J. McClane's *The Encyclopedia of Fish Cookery* attributes to Brennans's Restaurant in New Orleans a recipe that has the chef dust the fillets with flour before broiling, then prepare an elaborate sauce of flour, butter, onion, garlic, green pepper, capers, pimentos, and fish stock. It is poured over the fish before serving.

All recipes for cooking in sealed envelopes are basically alike, calling for laying the fillets on paper or foil, brushing with a sauce and sealing. Some say cook for about 15 minutes at 450 degrees, others recommend 45 minutes at 350 degrees.

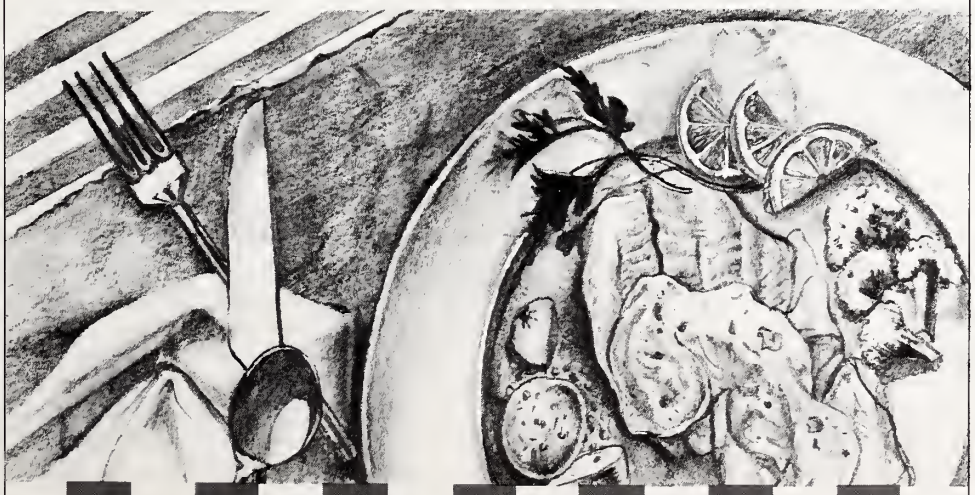
The purpose of an envelope is to trap steam and juices inside, but most modern chefs have abandoned buttered paper for foil. *The Joy of Cooking* by Rombauer and Becker requires placing the fillet on parchment paper and topping with tomato shrimp sauce containing chopped olives, parsley, mushrooms, chili sauce and chopped celery, besides the shrimp. Then you seal up the paper and bake 15 minutes at 450 degrees. The paper should be browned and puffed.

From my soiled and spattered copy of *Charleston Recipes* comes this one for "Pompano with Shrimp Sauce:"

6 pompano fillets
2 cups thick white sauce
½ cup chopped shrimp
salt to taste
½ clove garlic, minced
4 T. minced onion
4 T. chopped green pepper

Season sauce with shrimp, garlic, onion, pepper and salt. Spread fillets with sauce. Place each one on a square of parchment or cooking paper. Wrap so that no steam will escape and bake in a 350 degree oven for 45 minutes. Serve directly from paper.

Margaret Holt fries the pompano Dan brings home either headed and gutted or filleted. Her secret to fried fish is the breading mixture. It is half cracker meal, half Kellogg's Special K, crushed fine with a rolling pin. She sprinkles one-inch fish fingers or small fillets with salt and pepper while heating a film of vegetable oil in a skillet on medium-high. She dips the pieces in egg beaten with a little milk, then dredges them in the cracker meal/cereal mixture and fries them quickly on both sides until golden brown. Margaret serves her fried fish with tarter or cocktail sauce and garnishes with sliced lemons.



***Mole crabs** or sand fleas are very common along North Carolina's beaches where they bury in the wet sand under the wash from breaking waves. Many fishermen prefer soft mole crabs that have just shed their hard shell, but anglers who fish for the larger pompano farther off the beach around the sand bar often find that hard-shelled mole crabs stay on the hook better. Once caught, mole crabs survive fairly well if kept cool, and can even be kept overnight in the refrigerator.*

and minimal drag.

Look for a bar parallel to the beach — not necessarily with a break through it — and the wider the better. Doerr casts 70 to 100 yards so that he can fish either side of the bar, a long throw for any angler. Only a stiff rod will do it. The best are graphite, but in the length required for surf fishing — 9 to 12 feet — they are expensive. A graphite reel, medium-size for at least 250 yards of 10-pound test line, will be light and comfortable. The line should fill the spool to within ¼-inch of the rim for the cast to reach maximum distance. A shock leader of 14-pound test monofilament long enough to make three wraps on the reel spool and extend past the rod tip will be required or casters may break the line. Adjust the reel's drag so that it slips a little when you cast.

The wind behind you helps, but if it is onshore and light, don't despair. Calm, clear water is not required, although fishing will be more comfortable on a lee shore.

Doerr places his rod in a surf spike, leaving a light drag on the reel. Too much may cause the rod to be pulled over by a ray when he is not looking. He may fish two rods, one close, the other as far on the other side of the bar as he can reach. He sits down where he can watch both rods and lets the fish hook themselves, which they will do consistently with light wire hooks by pulling against the 3-ounce lead weight.

Pompano fishing improves in September as fish which have migrated past North Carolina return through inshore waters. Soon winds become northerly, air drier and cooler, the sun lower, light warmer. With water temperatures still above 70 degrees, pompano fishing will continue into early October at Cape Hatteras, later in the month at Cape Fear. The little jacks continue their migrations to tropical climates for the winter, leaving only a promise to return. ⊠

Prints Stamps & Waterfowl

Art collectors, sportsmen and stamp collectors are wild about North Carolina's duck stamp and print program, but it's been an even bigger hit for waterfowl.

by Lawrence S. Earley

Don't look now, but in the war to protect waterfowl habitat, the brush may well be mightier than the pen. The paint brush, that is. At least, that's what the evidence is saying about North Carolina's duck stamp and print program. Louis Frisino's painting of snow geese rising over Cape Hatteras is the most recent of a series of prints by distinguished American wildlife artists, including Richard Plasschert, Tom Hirata, Larry Barton and Ronald J. Louque, to appear on a North Carolina duck stamp. And it's another milestone in one of the N.C. Wildlife Resources Commission's most successful conservation programs.

Since 1983, the first year that state duck stamps and prints were offered, sales of the stamps and the prints have generated over $1.4 million for waterfowl conservation. Through 1987, the purchase of a state waterfowl stamp was optional, but beginning in 1988 the stamp was made mandatory for waterfowl hunters. The cost is $5. Art prints made from the stamp design sell for $135.

The revenues have provided a fiscal shot in the arm for the Commission, whose waterfowl program includes managing existing resources, acquiring and protecting wetland habitats, performing research and educating the public. Over the past few years, program money made the difference in the purchase of several tracts of priceless wetland habitat. In 1985, for example, duck stamp revenues contributed to the purchase of 5,320 acres of Roanoke River bottomlands, some of the best waterfowl habitat on the East Coast. A year later, another valuable Roanoke River tract, 3,750-acre Conine Island, was purchased with program money. The island is a paradise for mallards, black ducks, widgeon and teal. The North American Waterfowl Management Plan has targeted the Roanoke River as an important component of its goal to protect the dwindling populations of black ducks. The purchase of the 100-acre White Oak River Impoundment in Onslow County was also financed by funds from the program.

Money has also gone to administer the Commission's goose-banding project and has supported the work of two wildlife technicians in eastern North Carolina who manage waterfowl areas.

For many, however, the stamp and print program offers other incentives. Bill Cable, a Raleigh art dealer, says that generally the people he deals with buy prints for three reasons. "Some buy the print and stamp to support wildlife," he says. "And there are others who appreciate the artwork itself. They like the image, the colors, the artist—it's the print that appeals to them. Then there's the investor who may be looking at the print's future market value."

Cable cautions that the investment potential of a duck stamp and print is greatest for the first-of-state print. The 1972 Maryland first-of-state stamp and print, for example, are today worth $8,000, while the Iowa first-of-state stamp and print are worth $4,000. North Carolina's first-of-state duck print today is worth over $600—the print had a price tag of $135 in 1983.

Cable has a tip for would-be collectors of duck stamps and prints. He says that collectors may increase the value of their prints by purchasing a matched number series. "From an investment standpoint, a matched numbered set is the most valuable," he says. "Serious collectors make sure they get a print each year and make sure that they get the same number each year. In my collection, for example, I have number 50—all six prints in the current edition have the same number 50."

Whether it's the collectible nature of duck stamps and prints that attracts the buyer, or the desire to secure the future of waterfowl in North Carolina, the result is the same: more habitat and more ducks. And in these days of dwindling resources, that's a record to be proud of. ◻

MELISSA McCAW

Travel From Tennessee

Otters Find New Home In Smoky Mountains

Written and Edited by Vic Venters

Everyone has heard the saying "slippery as an eel" but biologists in Tennessee have discovered that the old adage might well be amended to "slippery as an otter."

At least two, and perhaps more, of the river otters that were reintroduced into the Little River in the Tennessee portion of the Great Smoky Mountains National Park this winter have made their way into North Carolina — in one case an otter even crossed a mountain range to get into the state.

Nine river otters were released on the Little River near Gatlinburg as part of an effort to restore extirpated species to the park. These otters — along with a group released in 1986 — are the first to roam the Smokies since the 1930s when they were eliminated from the region by excessive trapping and logging practices.

Although the otters have been surgically implanted with radio transmitters to allow researchers to monitor them, the wily mammals have proven to be elusive subjects for study. "Most of them have moved extensive distances from the release site to other drainages," said Kim DeLozier, wildlife biologist for the park. "We really don't know why they are moving so much." Only by air have the biologists recently been able to track the otters, he said.

The otters from this release have moved into several drainages in the North Carolina section of the park. However, this is not the first case of otters slipping into North Carolina, DeLozier said. In 1986, eleven otters were released on Abrams Creek near Cades Cove in Tennessee.

"Of those otters, we had a few where we thought the transmitter batteries had died prematurely. In fact, the otters probably moved on and we never located them again. At least one of those 1986-released otters made it to North Carolina." DeLozier added that a radio transmitter was later recovered from a dead otter near Cheoah Lake and returned to biologists. There have been possible sitings of otters on other North Carolina drainages as well.

North Carolina fishermen should not worry about the otters destroying gamefish populations, DeLozier emphasized. "Initially, there was some concern that the otters would impact the trout fishery. Fishermen were seeing scat piles along the bank with fish scales and bones in it and they thought they were eating trout." However, analysis by the University of Tennessee found there were no trout remains in the feces.

DeLozier said otters much prefer slow-moving species like white suckers, daces, sculpins and hogsuckers. "Trout are fast and much harder to catch," he said. "For them, those slow-moving fish are like picking sweets from a candy store."

A watershed in the North Carolina section of the park is the next proposed release site for the otters. This release could come as early as this winter.

Wouldn't it be typical if these otters crossed the mountains into Tennessee?

LEONARD LEE RUE III

Otterly Fascinating: *Several otters are now calling the North Carolina section of the Great Smoky Mountains National Park home. These otters are part of a group released in Tennessee, but instead of staying put, they have moved into North Carolina.*

Will Benefit Wildlife

Funds For Forests

An unexpected surplus in U.S. Forest Service funds will go toward needed improvements in wildlife habitat, visitor facilities and environmental monitoring in the four national forests in North Carolina.

An extra $565,000 is available for the U.S. Forest Service to spend in the Croatan, Nantahala, Pisgah and Uwharrie national forests. The additional funds were derived from excess timber receipts, which is money generated by timber harvesting beyond the forest service's projected revenues. "In the past, all of our timber receipts have gone into our general treasury," said Peg Boland, public affairs officer for the U.S. Forest Service in North Carolina. "This past year, however, Congress decided that money in excess of what they had projected should be available for a number of projects we have been unable to fund."

According to the Forest Service, at least $350,000 will be channeled to upgrade forest trails, improve wildlife and fish habitat, and restore drought-stricken areas of the four forests in the state. At least $75,000 of that $350,000 has been earmarked for red-cockaded woodpecker habitat improvements in the Croatan Forest, working with the N.C. Wildlife Resources Commission and Trout Unlimited to improve fisheries habitat and working with the National Wild Turkey Federation to create and improve turkey habitat.

About $100,000 will go to improving the "Cradle of Forestry" historic site and forestry learning center in the Pisgah National Forest near Brevard. The final $100,000 will be spent to monitor the environment when timber harvesting takes place.

Public Asked To Stay Out

Signs Mark Waterbird Nesting

The signs don't say "keep away," but if boaters or passersby on the coast happen across any signs reading "Bird Nesting Area," they should avoid disturbing the birds during nesting season between April and August.

The signs are the beginning of a new program to protect and manage colonial waterbirds such as pelicans, sea gulls and terns. Colonial waterbirds nest in large colonies, hence the name "colonial."

The N.C. Wildlife Resources Commission has negotiated a protection agreement with other federal and state agencies that own or have regulatory control over similar coastal nesting habitat such as state parks and national seashores. The program has been made possible by funds collected through the income tax refund checkoff on the state tax form for nongame and endangered species.

"These colonial waterbirds nest on the beaches, spoil islands and natural estuarine islands in North Carolina," said Randy Wilson, nongame section manager for the Wildlife Commission. "Many birds historically nested on the beaches but development has run them off. Now these spoil islands are critical for their nesting."

"If you go into one of these areas when the birds are on their nests and you keep them off the eggs, the eggs will overheat and they will not hatch," Wilson warned. "If you go in after they hatch, the young chicks will overheat in the sun and die or suffer from not being fed."

Disturbing the nesting sites, or otherwise harassing the birds, is in violation of federal laws protecting migratory birds. A toll-free phone number is posted on the signs so that violators can be reported.

Do Not Disturb: *The Wildlife Commission has posted critical nesting habitat for colonial waterbirds. If you see this sign, steer clear of the area between April and August. Intruding on the habitat during those months can cause nesting failure.*

Deputy Less Than Pleased With Photos

Giving is better than receiving, they say, and a certain law enforcement officer in the state might agree. Master Officer Tomie England of Franklin was in the process of writing a man a citation for a fishing violation when the man's wife jumped from the car and began snapping photos of her husband getting the ticket.

The man was noticeably perturbed and told her to put the camera away, but she just laughed and kept clicking.

His curiosity aroused, England asked why she was taking the photos.

"Because he's a deputy sheriff," she said laughing, "and as many tickets as he's written, I'm not going to miss taking a picture of him getting one."

by Jay Davies

Intentionally Runs Down Deer

Road Killer Caught, Convicted

Most drivers would go out of their way to avoid hitting any animal, but not everyone.

In Cherokee County this January, Area Sergeant Michael Stephens arrested a subject who had intentionally run over a deer with his vehicle.

A witness had seen a pickup truck swerve across a road, over a double yellow line, and chase a deer standing on a grassy area beside the road. The deer attempted to flee, but was run down. The subject then set a pair of Rottweiler dogs upon the wounded animal. "While the dogs pinned the deer down, the man pulled out a pocket knife and slit the deer's throat," Stephens said. "Then he put the deer in the back of the truck and left."

Fortunately, the witness recorded the truck's license plate number and phoned enforcement officers. Stephens and another officer eventually located the truck. At first the subject denied responsibility, saying the blood in the back of the now-empty truck was a dye used for marking hogs. But when a witness confirmed the subject's identity, the offender confessed and was charged with taking a deer by unlawful method and with possession of a deer taken by unlawful method.

He was found guilty of the charges and was fined $150 plus $44 court costs, as well as being charged a $249 replacement cost for the deer and the revocation of hunting privileges for a year.

Others Drive It Away

Camera Catches White Mockingbird

LEE LANIER

Rare Sight: *This white mockingbird was photographed by Lee Lanier, an eighth grader from Lexington, near his home. He notes that although the bird appears to be an albino, it does not have pink eyes. It also has a bit of color — a small gray spot on one side of its neck. Lee says that the other mockingbirds near his house drive the bird away when it comes near.*

Five-Year-Old Learns Pollution Lesson

Crab Freed From Plastic Prison On Oak Island

The sparkling tidal pools of Oak Island render a world of wonder for people of all ages. This July, they brought a very special lesson to my son David.

David loves to explore the tidal pools in his own special way. I call it the "poke and toe dig" method. I believe that every 5-year-old uses this form of exploration at some time, and David has turned up many interesting objects in his three years of beach exploring. We have had live whelks, hermit crabs, sand dollars and a multitude of starfish enter our lives this way. This year, we got Herman.

David found Herman while exploring a storm-formed tidal pool near the point at Long Beach. My first reaction to the 16-ounce plastic bottle David surrendered for my inspection was, "Oh no, another piece of trash."

David's reaction was immediate as he pointed to the bottle and said, "No, Mama, that's Herman."

I lifted the bottle higher and tried to see through the sides with no luck. The cloudy swirl of sand and salt water was blurred even more by the scratches on the bottle's surface and its mouth had become crusted over with hardened sand. I scraped away the sandy plug and peered down through the quarter-sized opening only to find myself eye to eye with Herman. Claws raised high in defense amid the swirling sand at the bottom of the surf-scarred bottle sat a crab, and not a tiny crab, but a 2½-inch-wide calico crab.

I've always considered the calico crab one of nature's most beautiful creatures, delicate in movement and unusually colored. How Herman had survived long enough in a bottle to grow to such a size I can only guess. The opening in the bottle was just wide enough to allow a small amount of water in with the change of the tide, and by the time we found Herman he could barely move in his plastic home.

David and I took the trapped inmate back to the cottage, where we made Herman a larger home by filling a three-liter Pepsi bottle with water from the same tidal pool where we had found him. David had decided that it would be easier for Herman to adjust to another bottle than to be freed immediately. I carefully cut the top from the smaller bottle and tipped Herman into his new home. Perhaps in David's young wisdom he was right, because Herman's confused reaction to more space was to panic wildly for almost 15 minutes. We kept Herman for the day, feeding him bits of bait shrimp which he greedily devoured.

Late that afternoon, David and I took Herman down to the surf to free him. A few tears were shed over the parting, and David gave Herman a stern warning to stay out of bottles. In the end Herman went back to the sea, and David learned a very special lesson in responsibility.

Every day we see headlines about how the sea is being polluted by chemicals, oil and medical wastes. For the most part, people ignore the warnings. After all, what can an individual really do about these things? Herman, however, wasn't the victim of news-making pollution. He was the victim of a carelessly discarded drink bottle, perhaps thrown from a bridge crossing the Cape Fear River somewhere far from the coast. This is the pollution we can do something about, and in doing our little something, perhaps we can save the wonders of the sea for our children's children.

—*Gloria Ribet-Cash*
Durham, N.C.

Lake Wylie Gets Ramps

Access Area Dedicated

Thanks to the N.C. Wildlife Resources Commission and Duke Power Company, boaters on Lake Wylie will have better access to the popular lake from now on. On April 13, Dr. Jack Hamrick, the former Wildlife Commissioner for District 8, helped dedicate the South Point Access Area which was developed jointly by the Wildlife Commission and Duke Power. The six-ramp site, located off Highway 273 south of Belmont, has a 180-vehicle parking lot and is the first boating-access area serving Lake Wylie to be constructed in North Carolina. Previously, boaters had to launch from access areas in South Carolina.

JANE ROHLING

Endowment Fund Grows: *Eddie Bridges, the former Wildlife Commissioner for District 5, is pictured here recognizing Marion and Dan Irwin for their contributions to the Commission's Wildlife Endowment Fund. Both generated several thousand dollars for the fund and are the sons of Frank T. Irwin, the first commissioner appointed in 1947 to represent District 5. Frank Irwin also served as chairman of the Commission in 1949. The Commission has also recognized the sponsors and exhibitors of the 1989 Bass Anglers Expo in Greensboro for helping generate more than $7,000 for the fund. Roger Parker, president of the promotion agency sponsoring the event, provided three lifetime sportsman's licenses to be given away at a drawing. Additionally, 10 percent of the gate receipts from the three-day show, along with proceeds from an exhibitors' auction, were added to the endowment contributions.*

Fly Fishing Small Streams

Fly Fishing Small Streams by John Gierach, $12.95, paperback, 1989, 159 pages. Published by Stackpole Books, Cameron and Kelkor Streets, Harrisburg, PA., 17105.

If you're a trout fisherman, and you haven't read John Gierach, then make it a point to do so. The author of four books, Gierach is best known for *Trout Bum*, a volume of reflective essays that is a bible of sorts for those of us whose highest aspiration in life is to catch the green drake hatch on the Henry's Fork -every year until we die, that is.

Gierach's latest work, *Fly Fishing Small Streams*, is one of the first books published specifically for the small stream trout fisherman, and in it, the author uses his contemplative style to deliver an information-packed and reflective how-to guide. This is harder than it sounds; many well-known trout writers bog down in a pretentious mishmash of sentimental gook when they attempt the same. While Gierach's prose is loaded with philosophical ramblings, it's also infused with just enough self-deprecating humor to prevent it from becoming bombastic. For instance, take this passage on the art of resting a pool:

"It's as close as I can come to honest meditation and I believe I've actually discovered some things about the hidden workings of reality while sitting in the grass, resting pools. I'd tell you what those things are, but I forgot them all when the trout started to rise again."

This is great stuff on its own, but what makes this a *complete* book are not its pithy observations but the author's extensive knowledge of the small-stream trout environment.

Although Gierach writes from his experiences on the mountain brooks of the West, most of the lessons he imparts travel well to our small, Southeastern freestone streams. There are valuable chapters on stealthy approaches for spooky trout, how to cast in dense cover, and what tactics and flies work best on the skittish fish and fast water of a typical mountain stream. This combination of how-to expertise and engaging prose will make the book enjoyable for the beginning or expert trout fisherman in North Carolina.

— *Vic Venters*

Enforcement Officers Inside

Poacher Captured By Own Vehicle

Most deer poachers have a bag of tricks they use to commit their crimes. Fortunately, their bag is often shallow and many of the ruses are "old hat" for experienced wildlife enforcement officers.

Take, for instance, a case last fall involving Lieutenant Tony Lewis and Master Officer David Gordon. The pair was observing a field where firelighting was suspected.

Sometime in the middle of the night, the officers observed a vehicle creeping down the road bordering the field.

From the car, a spotlight stabbed into the darkness, transfixing a deer in its glare. A rifle cracked and the hapless deer collapsed. As they watched, a man got out of the car and ran across the field to the deer while the car drove off.

However, the officers were familiar with the ploy. The poacher would drag the deer to the road to be picked up once he was confident the crime had not been observed.

Lewis and Gordon waited as the car approached, and when it was out of sight from the poacher they stopped it. "There were two women in the car," said Gordon, "and they were pretty shook up." Leaving the women in the patrol car, they drove the poacher's vehicle back towards the man and the deer.

Expecting to see the women, the poacher's eyes grew as large as saucers when he opened the door and was greeted by the smiling faces of the two officers.

The judge saw humor in the situation too, but when it came down to handing out sentences, he was all business. All three were convicted of spotlighting deer. The women were released but the man was ordered to pay a $250 fine and a replacement cost of $279. The judge also ordered the spotlight and rifle confiscated.

by Jay Davies

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on April 30, 1989

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	46,723	$16,276,347.07
Lifetime Hunting License	461	122,453.81
Lifetime Fishing License	3,554	745,288.52
Lifetime Subscriptions to Wildlife in N.C.	1,592	212,840.04
Contributions	—	150,179.85
Fund Total	52,330	17,507,109.29
Total Interest Earned	$4,151,719.01	

Spill Victims Get Help

Alaskan Wildlife Fund Set Up

Alaskan wildlife and fish threatened by this spring's Valdez oil spill will get some badly needed financial help from a special fund set up by the National Fish and Wildlife Foundation. Money collected by the fund will be disbursed on the recommendations of the U.S. Fish and Wildlife Service, the National Marine Service, and the Alaska Fish and Game Commission.

The fund was created as a result of public interest in helping the stricken wildlife of Prince William Sound and surrounding areas. "People across the country have expressed an overwhelming concern and are willing to contribute to assist in the recovery of the vital fish, plant, and wildlife resources affected by this devastating tragedy in Alaska," said Charles H. Collins, executive director of the Foundation.

The National Fish and Wildlife Foundation is a non-profit, charitable corporation and donations are deductible as charitable contributions. Donations should be sent to the following address: The National Fish and Wildlife Foundation, "Alaskan Fish and Wildlife Restoration Fund," 18th and C Streets, NW, Room 2556, Washington, DC, 20240.

Everyone's talking about

Wildlife in North Carolina . . .

the book!

"This book . . . is a fitting commemoration of the magazine's 50th anniversary. The book's four sections reflect the emphases seen each month, as the magazine seeks to interest nature lovers and environmentalists as well as the serious hunters and fishermen . . ." —Linda Brinson, Winston-Salem *Journal*

"It is not only for the sportsman in the family but for all the family and an excellent book to send both to Tar Heels who have moved away and to folks who have just moved into North Carolina . . . The only fault I find with *Wildlife in North Carolina* is that it is not long enough."
—Bugs Barringer, Raleigh *News and Observer*

Published by the N.C. Wildlife Resources Commission and the University of North Carolina Press. Hardbound copy is $24.95 at your local bookstores. **Or order direct using the special order form below.**

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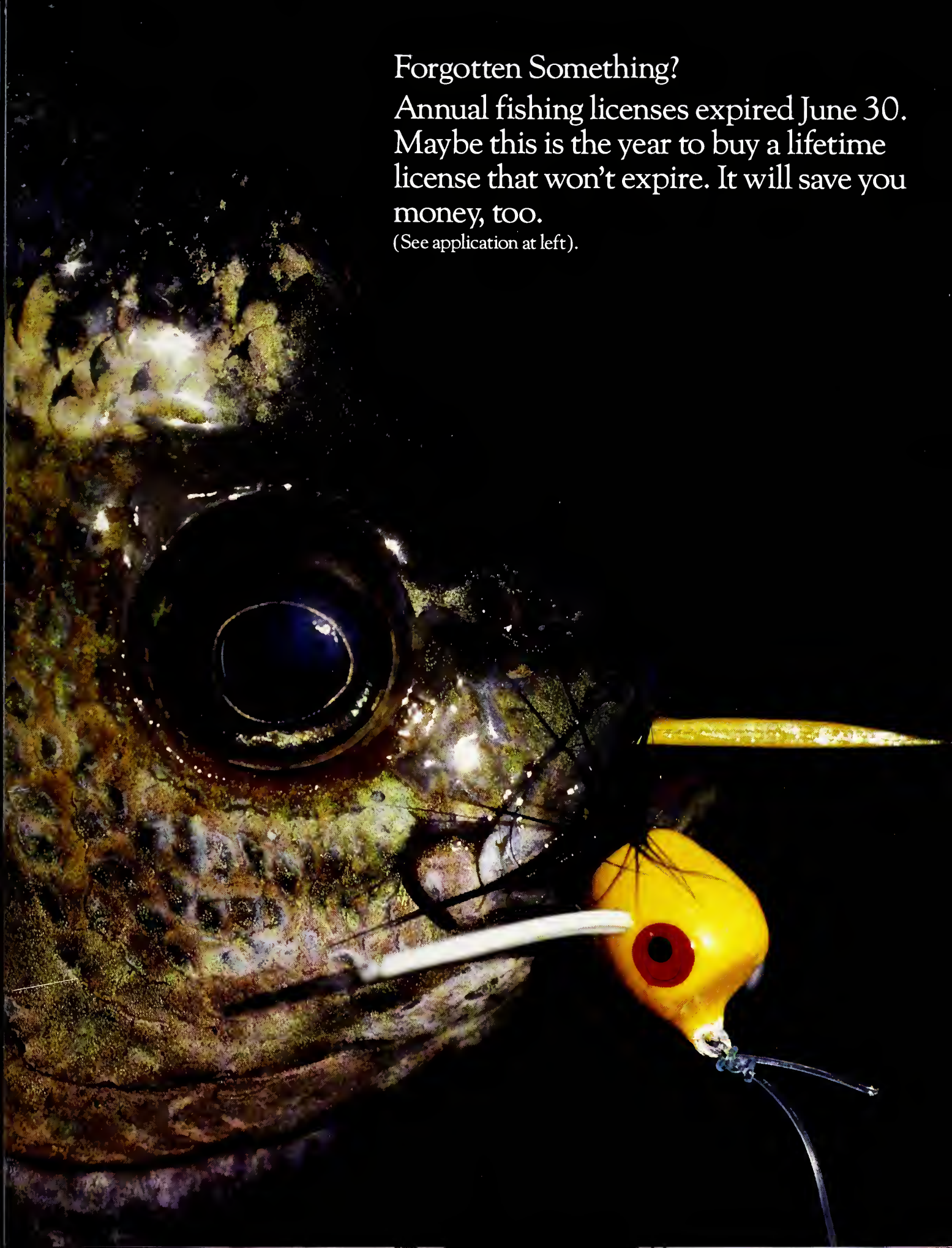

Forgotten Something?

Annual fishing licenses expired June 30. Maybe this is the year to buy a lifetime license that won't expire. It will save you money, too.

(See application at left).

Snows Over Hatteras

Snow geese are no strangers to North Carolina's Outer Banks, and are particularly common from Cape Hatteras north. This painting by Louis Frisino will appear on North Carolina's 1989 Migratory Waterfowl Stamp, and the sale of stamps and prints helps pay for waterfowl conservation projects in the state.

LITHOGRAPHY BY EDWARDS & BROUGHTON COMPANY, RALEIGH, NORTH CAROLINA

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WILDLIFE IN NORTH CAROLINA

AUGUST, 1989 75 CENTS

Bird Thou Never Wert

by Jim Dean

This is the time of year that mourning doves threaten to take over life on earth as we know it. When you wake up in the morning, there are half a dozen perched on the foot of the bed, and several more picking up grit in the hall. One sits on the toothbrush rack and watches you shave.

Power lines look like strings of pearls sagging with beak-to-beak doves. Doves are begging bread crumbs in the malls and city squares, and they have reached such a state of obesity that they can barely waddle out of your driveway to keep from being run over. Throughout the land, the mournful voice of the turtle dove swells to a chorus that would make the Mormon Tabernacle Choir sound like kids at Vacation Bible School.

LEONARD LEE RUE III

Those of us who wait patiently for this time of year are wise to all this shameful duplicity. We know what's about to happen as well as the doves do, and brother, it ain't what they'd have you think.

If you read the fine print in Mother Nature's manual, you will discover a clause that explains this sudden deluge of doves. Under standard dove operating behavior are these instructions: "Appear ubiquitous in August; disappear in September. It drives hunters nuts. To determine the exact day of disappearance, consult local hunting regulations for the opening date of the season. Meanwhile, don't worry, be happy." I have filed all this under suspicions confirmed.

Of course, every dove hunter is familiar with the mourning dove's taunting omnipresence prior to the season, and sudden scarcity when the season opens. Nor does it help to know that doves are so prolific that their numbers have never been higher, and may be increasing. Ornithologists tell us that this sudden annual exit is not a mystery, and that the birds are simply keyed into weather changes and migration patterns so that the slightest cold snap or wet weather can push whole legions south overnight—usually on the evening before opening day. (Okay, so where the heck are those legions to the north of us that should be arriving here. Don't they have cold snaps up there?).

Experts have had less success explaining weight loss and conditioning in doves. How, for example, can a dove that is so roly-poly it can barely hop over a curb on the last day of August manage to achieve supersonic flight by Labor Day? All I know is that it's hard to believe there is any kinship between the corpulent creature vacuuming seeds at my bird feeder, and the Mach II missile that comes in at 12 o'clock high over cut corn and pines a few days later. What transforms doves from pullet to bullet?

Even under ideal conditions, the dove hunter is at a greater disadvantage than you might suspect. If you can imagine what it might be like to spray a low-flying F-16 with a garden hose, you've got a pretty good idea of the odds on any given shot.

On the other hand, if you can bag enough doves for a meal, you're in for a treat. Over the years I have managed this feat just frequently enough to pass along accolades for dove breasts wrapped in bacon and roasted over charcoal. I can also attest to the edibility of a casserole of boned dove breasts baked with bread crumbs, sour cream, sage, sliced green peppers, chicken broth and sherry.

For those not initiated, there is a traditional way to hunt doves in North Carolina. You start with a 140-pound pig, portable pit-cooker, 5 gallons of cole slaw, corn on the cob, a foothill of hushpuppies and washtubs full of iced-down watermelons. After a mid-day porkout, the hunters who have not opted for naps take up positions around a large, likely field. If all goes normally, waves of doves will begin to fly in to feed with the flights becoming larger and more numerous as the afternoon progresses. The theory is that you need enough hunters to keep lots of doves moving, but one bird can be more than aplenty at times.

I once counted 22 missed shots at a single dove that darted across a 30-acre field, circled a few pines, then decided it was safe after all. As astonished shooters watched, it fluttered back into the the field, pulled up a stool, put on a bib, and had itself an ear of corn.

The hunts I remember best, however, have been ordinary by most standards, and uncrowded by choice. One took place nearly 30 years ago with my grandfather, father and brothers. We sat on stools in the shade of a magnificent walnut and took turns kidding each other about our dismal shooting skills.On another occasion, Mike Gaddis and I built a blind of corn shucks on a crisp, bright day during the second half of the season, and let his superb Labrador retriever, Squaw, do most of the work. We knew doves were coming when Squaw shivered, and she dutifully retrieved Mike's limit, along with several that happened to be in the wrong place when I shot.

Most of all, perhaps, I remember the Indian summer afternoon I had a field all to myself and spent most of it watching huge, puffy clouds sail past like clipper ships. I didn't fire a shot, but dreams were in the wind, and a dove casserole was home in the freezer.

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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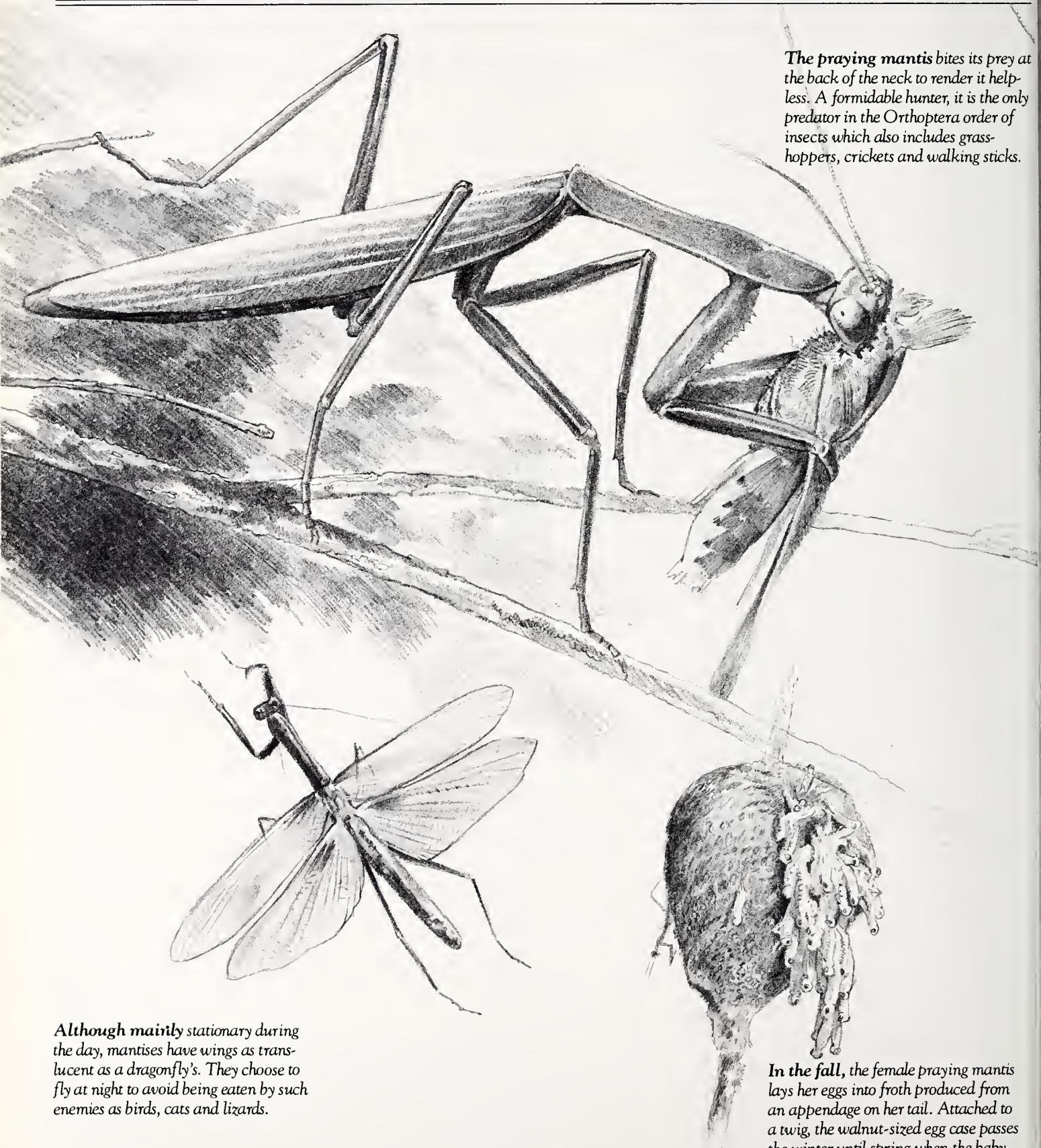


The praying mantis *bites its prey at the back of the neck to render it helpless. A formidable hunter, it is the only predator in the Orthoptera order of insects which also includes grasshoppers, crickets and walking sticks.*

Although mainly *stationary during the day, mantises have wings as translucent as a dragonfly's. They choose to fly at night to avoid being eaten by such enemies as birds, cats and lizards.*

In the fall, *the female praying mantis lays her eggs into froth produced from an appendage on her tail. Attached to a twig, the walnut-sized egg case passes the winter until spring when the baby mantises hatch. They emerge from the case, hang by a silken thread until reaching the ground, and then scatter.*

Love At First Bite

written by Lawrence S. Earley / illustrated by David Williams

Most people know all about the praying mantis. *Yeah, the female devours the male, leaving nothing but wings and legs. Yecch!* Nature writers are not often much more dispassionate, the mantid's cannibalism driving many of them to the heights of anthropomorphic horror. Their language tends toward the overheated as they describe the "grisly rites" of decapitation and the "unwary victim." *The mantis is as fierce as a tigress, cruel as an ogress.*

Well, it's a fate that seems to dog most predators, isn't it? Male or female, predators are just not nice, people seem to think, and the praying mantis, as one of the insect world's most dedicated predators, is by default one of its nastiest.

Indeed, the mantis is conspicuous by its appetites. It's the only carnivorous member of the Orthoptera family, an insect group that includes such pacific creatures as crickets, walking sticks, green katydids, grasshoppers and even cockroaches. It's equipped with a variety of extraordinary physical adaptations for a predatory life: a head that swivels to follow its prey; remarkably accurate eyes; a green coat that's perfect camouflage for the foliage where it hides; and two front legs that are adapted for seizing and holding prey, usually other insects, but also mice, snakes and even small birds. Its forelegs are covered with sawlike spikes that clasp these morsels in a viselike grip.

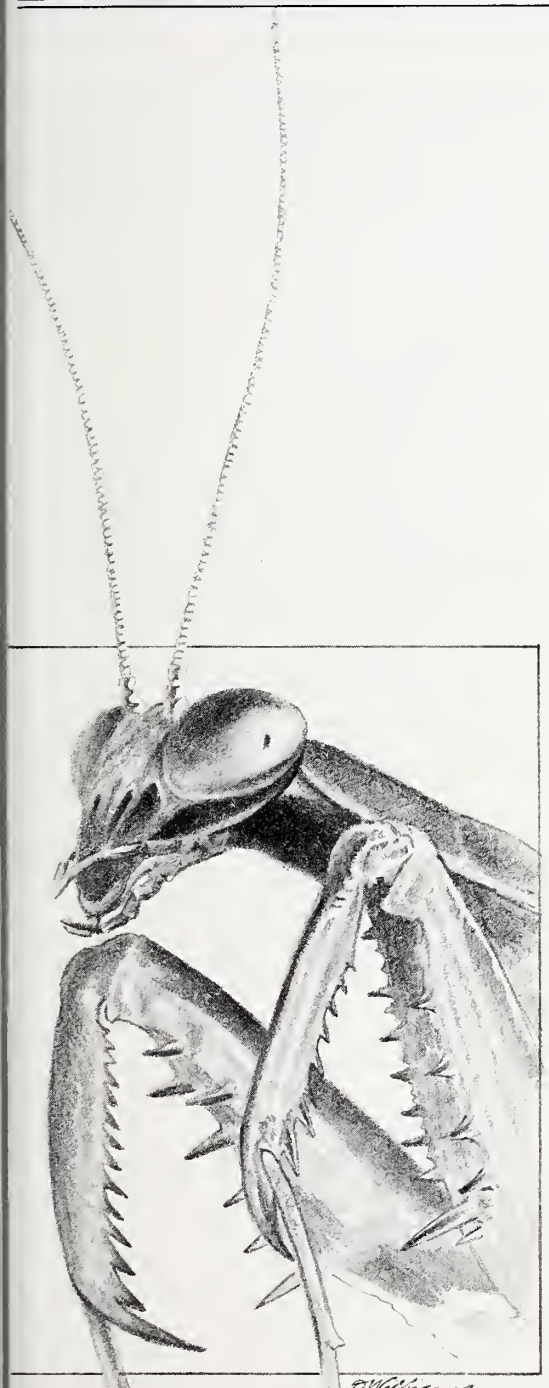
Behaviorally, the mantis plays a waiting game rather than actively stalking its prey. It assumes a watchful and motionless position on a flower stalk, holding its front legs forward almost piously (whence comes the term "praying" mantis). Some mantids sway lightly to and fro as if imitating a branch being tossed by a light breeze. When a grasshopper approaches too closely, the mantis's front legs dart forward to grasp it between the upper and lower parts of its deadly, spiked forelegs.

Which brings us back to the female's strange nuptial rite. Let's review the charges: In the fall of the year, the male courts a female by approaching her from behind, and then leaping onto her back. The female may not be swayed by his amorous advances. She may grasp him with her spiked foreleg and eat him forthwith. But even if he's successful and in the midst of mating, the female may still turn and bite his head off, steadily making a meal out of him until nothing is left except a few wings and stringy legs.

Why would nature have programmed such a deadly feast at such a seemingly inappropriate time? It's a question scientists have pondered for hundreds of years. Explanations have ranged from the simple to the complex. One of the simplest explanations is that the male is just another nutritious meal. The female is hungry; the male is nearby. Off with his head! Another school of thought suggests that the male has served his purpose through mating and is dispensable.

One intriguing theory focuses on the observation that the headless male apparently isn't at all distracted by his decapitation. If anything, he seems to perform with even more élan. Experiments have discovered that the brain's inhibiting effect is removed with the head, and thus mating goes much more easily. This suggests that the species may well be better off with love-crazed, but headless, males.

All of which contribute to understanding the mysterious cannibalism of one of nature's most voracious insects.



***Predatory adaptations** of the mantis include large compound eyes, a head that swivels, biting mouthparts, and grasping forelegs. Like other insects, the mantis has six legs, although the forelegs are used mainly for attack. Spikes on the first and second part of each foreleg clasp prey in a fatal embrace.*

CROOK-BILLS ON OUR COAST

Though they might seem more at home in the tropics, two species of ibis have recently settled in North Carolina, thanks at least partly to man-made spoil islands in coastal rivers.

by Lawrence S. Earley

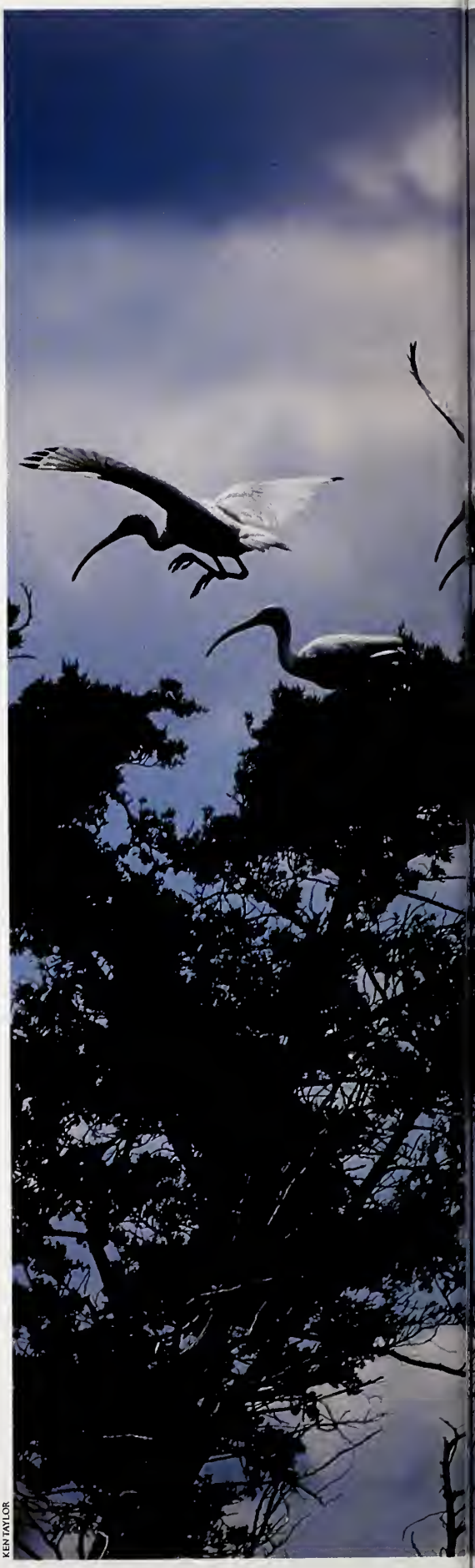
The ibis seems so exotic that you're surprised to discover that it occurs in North Carolina at all. Perhaps it's the long, decurved bill or maybe the fleshy face that turns blood red at times, adaptations that put the ibis in the same league as the roseate spoonbill or the flamingo. Something spectacular. Something tropical. Something at home in a mangrove swamp, say, but out of place in North Carolina.

"You're very nearly correct," Jim Parnell said to me when I checked my puzzlement with him. Parnell is professor of biology at the University of North Carolina at Wilmington whose work with colonial shorebirds is well-known. "Originally, ibises were confined to Florida and only moved into North Carolina in the 1950s. They're a relatively new bird here in the state and they seem to be expanding their range north."

A few weeks later, in a 17-foot Boston Whaler, I was bouncing my way east across the lower Cape Fear River hoping to learn a little more about these Florida immigrants. My destination was Battery Island, the nesting site of almost 9,000 pairs of white ibis (up 2,000 pairs from last year) and perhaps a dozen pairs of the less common glossy ibis. Leased from the state by the Audubon Society, Battery Island has the largest white ibis colony in the state and is a protected sanctuary, one unit in Audubon's North Carolina Coastal Sanctuary System.

My guide and companion was Walker Golder, a slender graduate student who is working on a Master's degree on white ibis with Jim Parnell. He's also the Audubon Society's warden of the sanctuary. Normally the island is not open to the public. Golder's job is to patrol the area preventing the curious from disturbing the nests during the nesting season between March and September. Our visit was a special privilege.

From a distance, Battery Island is low and squat, perhaps a half mile long, with rising hummocks of



KEN TAYLOR

***Unmistakable with** their decurved bills, white ibises rise from their roosts on a spoil island in the Cape Fear River. Like herons and egrets, ibises nest in dense colonies sometimes 60 or 70 strong. They prefer to build their nests in red cedar and yaupon trees.*

WILLIAM WALKER GOLDER

LAWRENCE S. EARLEY

***Immature ibises** are splotched with brown markings (above), achieving their white feathers after their second year. Immature and adult ibises can eat food from both saltwater and freshwater habitats, usually fiddler crabs and crayfish. Fish crows are the main predators on an ibis colony. Sometimes crows build their nests in the midst of the colony, stealing eggs and consuming their contents (right).*

trees and bushes at each end. It's in these thickly growing red cedars and yaupons that the ibises build their nests. This little mound of sand and shrubs is one of 400 islands created from dredged materials in the state's coastal waters, man-made habitats that have been critical to the expansion of the ibis populations.

As we approached Battery Island, Golder noted that the nesting birds were concentrated in two colonies. "The white ibis are concentrated in South Colony and the glossy ibis, which are much rarer, are found only in North Colony. These are the two species that occur in North Carolina. But other colonial waterbird species also nest here, nine in all. In fact, the only ones that don't are the great blue heron and the yellow-crowned night heron."

After anchoring the boat, we splashed ashore and

CROOK-BILLS ON OUR COAST

WILLIAM WALKER GOLDER

strolled along the seawrack line to South Colony. Clumps of thickly branched yaupon trees and red cedars were breached by shrubs pruned to knee-heighth every spring by ibises seeking nesting materials. As many as 60 or 70 nests were crowded into a single tree, following the "safety-in-numbers" instinct of a colonial nesting bird.

"You can see them clearly now." Golder pointed to the top of a cedar where 30 or 40 white ibises were fluttering and loudly arguing among themselves. Every now and then they leapt into the air and flew short distances. Their black wing tips contrasted with their white bodies. "See that one that landed there. Notice how long the bill is. That's a male and that's one of the ways you can distinguish the sexes." The male's bill was at least 3 inches longer than a nearby female's.

"Those are all adults. Immature birds are brown. Adult birds, especially during the peak courtship and breeding season, are a brilliant white, their faces and legs blood red. At this time they're just beautiful birds. But it only lasts for about two weeks. After they've made their courtship pair bond, apparently they don't care what they look like. Sometimes they look like someone's dragged them through the mud."

We walked beneath one nesting tree to examine the nests. They were broad and shallow constructions made of twigs and thin branches. Apparently the birds continue to add to their nests even after the chicks are hatched. Inside the nests were two, sometimes three, greenish eggs speckled with brown (the glossy ibis have bright blue eggs). Under the nests there were many empty egg shells,

***The male ibis** (above, right) has a longer bill than the female. The female in this picture has extended her gular pouch. For a brief, two-week period before nesting, both male and female develop an intense red coloration in their bills, face and feet.*

CROOK-BILLS ON OUR COAST

KEN TAYLOR

***The bills of** these nesting white ibises have already faded to orange. Ibises incubate their three or four eggs for about three weeks. When the chicks hatch, they are not able to eat saltwater food until they've developed salt glands. White ibises are pure white, with the exception of the tips of their feathers which are black (right).*

KEN TAYLOR

some of them with a hole drilled neatly through.

"Fish crows," Golder said as I knelt to examine one such shell. "You can tell by the hole. Thirty percent of all eggs laid in a colony are lost to predation, usually to crows. Crows will even nest in the same tree with ibises. One researcher found a crow feeding station with as many as 200 eggs. That's a lot of predation. Black-crowned night herons will sometimes take a nice plump chick. But obviously the birds are producing enough eggs to more than maintain the population."

We retraced our route along the beach until Golder found a path that led to an observation blind in the middle of the colony. As we dipped below the low-hanging branches of the thickly growing trees, the ibises issued a cacophony of grunts, honks and squawks. Golder said that some people swear that

you can hear your name in an ibis squawk, but to me the birds sounded like a drunken crowd of New Year's Eve revelers with noisemakers.

The blind was a cozy box with hinged ports that could be opened or closed. It was perched on legs about 20 feet high, about the height of the trees surrounding us. After clambering aloft, we waited in the semi-darkness for the birds to calm and Golder described some of his research on ibis.

"I've been working with Dr. Jim Parnell on my Master's on colonial wading birds for a couple of years now. I'm looking at the feeding ecology of ibises, and looking at flight patterns during the nesting season. Ibises feed equally well in both saltwater and freshwater systems. In saltwater marshes they feed primarily on fiddler crabs, and in inland swamps they'll take mostly crayfish. Their curved bills are perfect instruments for probing the crabs' burrows."

The unique thing about ibises, Golder said, is that they can apparently eat only freshwater food when they first hatch. The salt glands, which help the ibises tolerate the salt in their food, don't develop in chicks until they're a couple of weeks old. The females do most of the feeding of the hatchlings for the first 10 days, and they have to go to fresh water to get their prey. But whether they're taking care of their own food needs there as well as their chicks' or whether they're also feeding in surrounding salt marshes isn't really clear.

"I'd follow birds in the air to see where they were going," Golder said. "Take a plane out and just follow a single bird. I've been surprised by some of the things we've found. For instance, we've recorded birds flying to Lake Waccamaw — that's 70 miles by air.

"We're wondering where they go after the colony breaks up in mid-August. The chicks usually fledge in July, although with all the weird weather this spring, nesting has been late by about three weeks. Forty or 50 days after hatching the chicks will be ready to fly and the colony will disperse. No doubt some birds come back here at night to roost, but we're not sure where the others go. A lot of birds will move to Bald Head until the fall."

We raised the window on one side and carefully snuck a bird's-eye view of the colony. One ibis was scarcely 10 feet away and as I moved into position it nervously (and somewhat comically) slid down a diagonally slanted branch away from me. With the courting season over, the bird's intense vermilion coloration had faded. Its bill, legs and feet were much paler than they would have been three weeks ago, and so was the fleshy area around its face. Its eyes were a startlingly clear blue. Another bird seemed to be covered with an ashy layer of mud. In the distance, other birds sat quietly on their eggs and preened their feathers.

"Do you want to see some glossy ibis?" Golder asked me a short while later as we were walking back to the boat. I was eager, so we brought the boat farther down the shoreline toward North Colony and anchored it off a high-tide creek. The water was thigh-high near the boat but as we approached North Colony it grew shallower and soon our boots were pushing through short grass covered with periwinkles. We continued walking through the short grass as we circled the small hummock.

Glossy ibis are uncommon in North Carolina today, leading some to suggest that the bird be placed in the "Special Concern" category on the state's rare and endangered species list. At one time, there were perhaps a dozen nesting pairs on this end of the island, but Golder wasn't sure if we'd see any. The trees were packed with birds again — egrets of all kinds and black-crowned night herons.

Suddenly a dark-colored bird rose high off its roost, and then another. "Glossies!" whispered Walker excitedly. They were about the same size as a white ibis and had the same decurved bill, but at a distance they looked almost black. I waited until the sun was behind me and then glassed one of the spectral birds as it wheeled in the sky above. I was astonished at the rich iridescence of the bird's feathers. In the neck, head and shoulder area there was a coppery sheen, while their wings carried a green and purple coloration.

The wind had picked up quite a bit by the time we headed back to Southport and white caps were roiling the river. Above the wind, we shouted at each other about the progress of the Colonial Waterbird Project, a cooperative project among state and federal regulatory agencies and the Audubon Society to maintain nesting habitat on islands like Battery Island. The N.C. Wildlife Resources Commission is the lead agency for the project and the Commission's Nongame and Endangered Wildlife Checkoff Program is funding it.

KEN TAYLOR

***The glossy ibis** (left) is rare in North Carolina. Though appearing black from a distance, up close its feathers are subtle exchanges of copper and green iridescence.*

"The great thing about it," said Golder, "is that representatives from all of these agencies have been willing to work together for the good of the birds. This program will bring attention to some of the more beautiful and familiar birds of our coast, birds such as egrets and herons."

It may also cast a spotlight on the less familiar ibis, a Florida waterbird that looks like it'll be calling North Carolina home for a long time to come. ⊠

FISHING'S FUTURE IN THE SALT

The management of fish populations in salt water is still in its infancy and, at this point, is very complicated. Yet, how well we succeed will determine the future of life in the seven seas.

written and photographed by Joel Arrington©

Probably most people know that the North Carolina Wildlife Resources Commission manages and protects the state's freshwater fisheries, but what agencies look after saltwater fishing? How can anybody manage ocean fish populations anyway?

Good questions. The answers could shed light on controversies between groups that use salt water fishery resources and lead to fuller participation in the democratic process. Knowledge of how the related management systems work can help get views heard and considered.

Nowhere is the growing popularity of salt-water fishing more evident than at Cape Point on Hatteras Island (left) during a run of big red drum, also known as channel bass or redfish. The study and regulation of some ocean fish populations is a complicated process, and regulations already restrict catches of species such as red drum or the flounder caught by this angler (right).

Fresh water fish populations are localized and relatively contained and therefore can be, with modern wildlife management techniques, measured fairly accurately. Consider, however, the formidable challenge of managing salt water fish populations which are of largely unknown dimensions and which move by means of partly mysterious migrations through vast ocean depths. Further, these fish, managers are fond of saying, do not recognize jurisdictional boundaries. They migrate through waters under state control from and into waters controlled by neighboring states, as well as from and into the federal zone offshore. Many range throughout the oceans. In addition, groups with often conflicting interests try to encourage management which suits their particular needs and desires. Commercial fishermen in Florida, for example, can, if regulations permit, catch nearly all the Spanish mackerel before they have a chance to migrate to our waters.

North Carolina has a two-part structure for marine fisheries management: the Division of Marine Fisheries (DMF), which executes policy, and the Marine Fisheries Commission (MFC), which makes it.

The MFC is appointed by the governor. Of 15 members, four must meet qualifications as commercial fishermen, four as sport fishermen, three as marine scientists, two as sea food processors and two at-large commissioners in occupations affected by regulations of the MFC. Appointees must also meet certain residential qualifications. The Marine Fisheries Commission is authorized by statute to make regulations without legislative approval, except on certain revenue (license) matters. Its rules, like those of all state regulatory commissions, have the force of law. North Carolina's coastal waters out to three miles is its geographical area of jurisdiction. The MFC may take suggestions from the public and from the DMF, which serves as staff, administrator and source of information.

While two annual regulatory cycles are possible, in recent years the Commission has tried to limit itself to one. Ed McCoy, administrative assistant in DMF, said a slower pace had proved more prudent, giving the public, staff and commissioners more time to consider regulations thoroughly and thus avoid mistakes.

A cycle begins with a series of public meetings (not hearings, which come later) at which the public is invited to present its views on any issue under jurisdiction of the MFC. The Commission may announce and hold these meetings at any time, but they have recently been held in the fall. In 1988, meetings were held at four coastal locations and in Raleigh. McCoy said a meeting at Winston-Salem one year was poorly attended and that few appear at Raleigh meetings.

The MFC then meets in business session to decide what regulations, if any, it will bring to the public hearings. State law requires that exact wording be approved before any regulation is advertised. Widely circulated newspapers generally carry notice of the proposed regulations, which must be published in the *North Carolina Register*, an official organ of the N.C. Office of Administrative Hearings.

Law requires a minimum of 30 days to elapse before the MFC can hold public hearings on those regulations, which then may be adopted in a business session any time after public hearings. However, a period of 75 to 90 days is required for the earliest effective date following adoption by the MFC and filing with the Administrative Rules Review Commission. If any step is missed or delayed, implementation can be delayed.

The MFC has authority to adopt regulations made by other agencies, such as the South Atlantic Fishery Management Council (SAFMC) and the Atlantic States Marine Fisheries Commission (ASMFC), an option it has not exercised, but continues to weigh.

The Commission must, by law, consider at its next meeting any lawful petition directed to it. Individuals may write to the Commission or appear at public hearings or public meetings. McCoy recommended that citizens appear at meetings, unless they wish to address specific proposals already under consideration, in which case they should come to a hearing. In either case, they may alternately submit comments by mail. Once rules are published in the *North Carolina Register*, the Commission will take comment at any time up until

Pressure on red drum has grown in recent years, partly because of the influence of such popular cajun recipes as blackened redfish, and regulations now restrict their harvest in some areas. Even so, marine biologists know relatively little about many species, although increased commercial and sportfishing pressure has obviously affected populations of some popular fish.

the point of final decision.

While each coastal state has had for a long time an agency to govern salt water fisheries within its own waters, such problems as that with Spanish mackerel and other migratory species led to regional approaches to fishery management.

The Atlantic States Marine Fisheries Commission, an advisory group based in Washington, D.C., promotes better utilization and management of fisheries among 15 Eastern Seaboard states. Created in 1942 by federal law, the ASMFC offers suggested management plans for species that migrate between states' territorial waters. These include striped bass, red drum, flounder and 11 other fish.

Each state provides three representatives, but gets only one vote on each issue. North Carolina's commissioners include one from the legislature, one from the Division of Marine Fisheries, and one appointed by the governor.

The states themselves write ASMFC management plans for each species of finfish and shellfish. In every case but one, these plans may be adopted by member states or not, according to their wishes. The lone exception is that the Atlantic State Striped Bass Conservation Act of 1984 requires the states to adopt management goals of the ASMFC's striped bass plan, a provision to which even its executive director, Irwin M. Alperin, objects. "The Commission's advisory plans have worked well for other species," he said, "but this takes away traditional state's rights."

Charles Manooch, N.C. Wildlife Federation board member, research biologist with the National Marine Fisheries Service, and member of an advisory committee on Roanoke River flow, agrees. "North Carolina is perfectly capable and willing to manage its own fishery resources without direction from anyone," he said.

With fishermen and harvest pressures increasing every year, the need for management of species like billfish and mackerel, which live in and migrate through offshore waters, became apparent.

The federal Magnuson Fishery Conservation and Management Act of 1976 extended

jurisdiction of fisheries out to 200 miles and set up eight regional councils around the country. Their job is to manage fisheries in the U.S. Fisheries Conservation Zone, which lies between three and 200 nautical miles offshore. North Carolina falls into the South Atlantic Fishery Management Council with South Carolina, Georgia and Florida. Headquarters reside in Charleston, South Carolina.

Council members serve three-year terms and are appointed by the U.S. Secretary of Commerce from lists of nominees submitted by state governors. The officials responsible for marine fisheries management in each state, as well as the Regional Director of the National Marine Fisheries Service, are also voting members. North Carolina sends a representative from the DMF. Non-voting members include representatives of the U.S. Fish and Wildlife Service, U.S. Coast Guard, State Department, and the ASMFC. Councils are federally funded.

Council management plans seek to produce the "Optimum Yield," defined as that amount of fish that will provide the greatest overall benefit to the nation with particular reference to food production and recreational opportunity. So far, North Carolina works under snapper/grouper and billfish plans and under a plan for migratory pelagic fishes, which includes mackerels and cobia. Current plans are subject to amendment, and other plans are in progress.

Council management plans are hammered out laboriously over sometimes years, in meeting after meeting, at considerable expense, both in time and in money. Plans may embrace more than one region, making acceptance by all much more difficult to attain. However, final approval rests solely in the hands of the U.S. Secretary of Commerce. If he chooses, he can simply say no.

For reasons of international relations, and because tuna migrate so widely through the world's oceans, they are specifically excluded from the Magnuson Act. Instead, international treaties govern their management, a fact lamented by many anglers and conservationists in this country. They believe tuna should not be pawns in deals between our State Department and foreign governments, but rather should be objects of both regional management plans, like billfish, and treaties.

The Magnuson Act requires councils to formulate plans using the best available scientific information. Unfortunately the best available is not good enough—ocean fish being where they are and the way they are—and a good deal of guessing inevitably comes into play, sometimes creating dispute.

Increased sportfishing *creates growing lines at ramps and additional pressure on many species. Historically, the oceans are so large that efforts to study fish populations and regulate harvests have lagged behind freshwater fish management.*

A case in point is the king mackerel closure of 1988. In general outline, management plans seek to define, as best they can, existing total poundage of a given species and allocate to commercial fishing and to recreational fishing each a share based on tradition and the best information available. At the beginning of a fishing year, usually April 1, a plan declares that there are so many pounds for commercial fishermen, so many for anglers, who may catch them within whatever rules have been specified. Later, when the council determines that commercial fishermen, for example, have caught their allotment, it may close the season for them until the next fishing year.

Anyone can appreciate the difficulty of determining when a certain poundage of fish has been caught by thousands of fishermen and anglers spread over long coastlines of four states. A special section of the National Marine Fisheries Service does it by sampling, formula and computation. So when, in October of 1988, the NMFS reckoned that anglers had caught their 4.4 million pound allocation of king mackerel, it declared the recreational season closed. Later, NMFS determined that commercial fishermen, too, had exceeded their allocation and in November closed their season as well. North Carolina fishermen and anglers were not amused.

Over 100, led by the state Attorney General's Office and the DMF, sued to reopen in U.S. District Court, claiming that the total allowable catch had been arbitrarily set too low to begin with and that, anyway, the NMFS had not accurately determined that allocations had been exceeded. Judge Malcom J. Howard issued a preliminary injunction whose effect was to reopen the king mackerel season.

Margaret Frailey, chief counsel for NMFS, argues that the Magnuson Act expressly forbids reopening of a closed fishery while a suit is in litigation. Plan supporters said king mackerel stocks would be overharvested because of the reopening. Even large issues, therefore, hang in the balance.

The legal action by North Carolina casts a shadow over all fishery management councils' ability to manage oceanic fisheries. Until the courts rule on the authority of states and individuals to intervene in regional management plans, doubt will linger over the council system.

But nearly everyone agrees that some mechanism is necessary to protect and allocate highly migratory ocean fishes. Commercial fishermen have for a long time been organized and forceful voices in management. Recently salt water sport fishermen have begun to organize. The Atlantic Coast Conservation Association formed a North Carolina chapter late in 1988 and aspires to offer anglers a united voice with which to express their views.

Groups and individuals who know how the system works and take an active interest will likely see their opinions prevail. ☒

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Alan Cheek © 1987

ON THE WATERFRONT

KEN TAYLOR

With Alan Cheek

With brushes and paint, Alan Cheek pursues his affection for the Outer Banks, tidal marshes, commercial fishing and colorful artifacts of life in coastal Carolina.

by Vic Venters
paintings by Alan Cheek

When asked why he paints, artist Alan Cheek grasped for words. "It's just something I've always done," he said hesitantly. "I really don't know why I do it."

Reasons aside, Cheek is an effective communicator and chronicler of North Carolina's coast. Each of his works represents a particular moment of time in which Cheek captures both the impermanent nuances of light and color and the longstanding majesty of our land and seascapes. "What I'm trying to do is preserve a scene, and also convey the emotion I had when I saw it," Cheek explained.

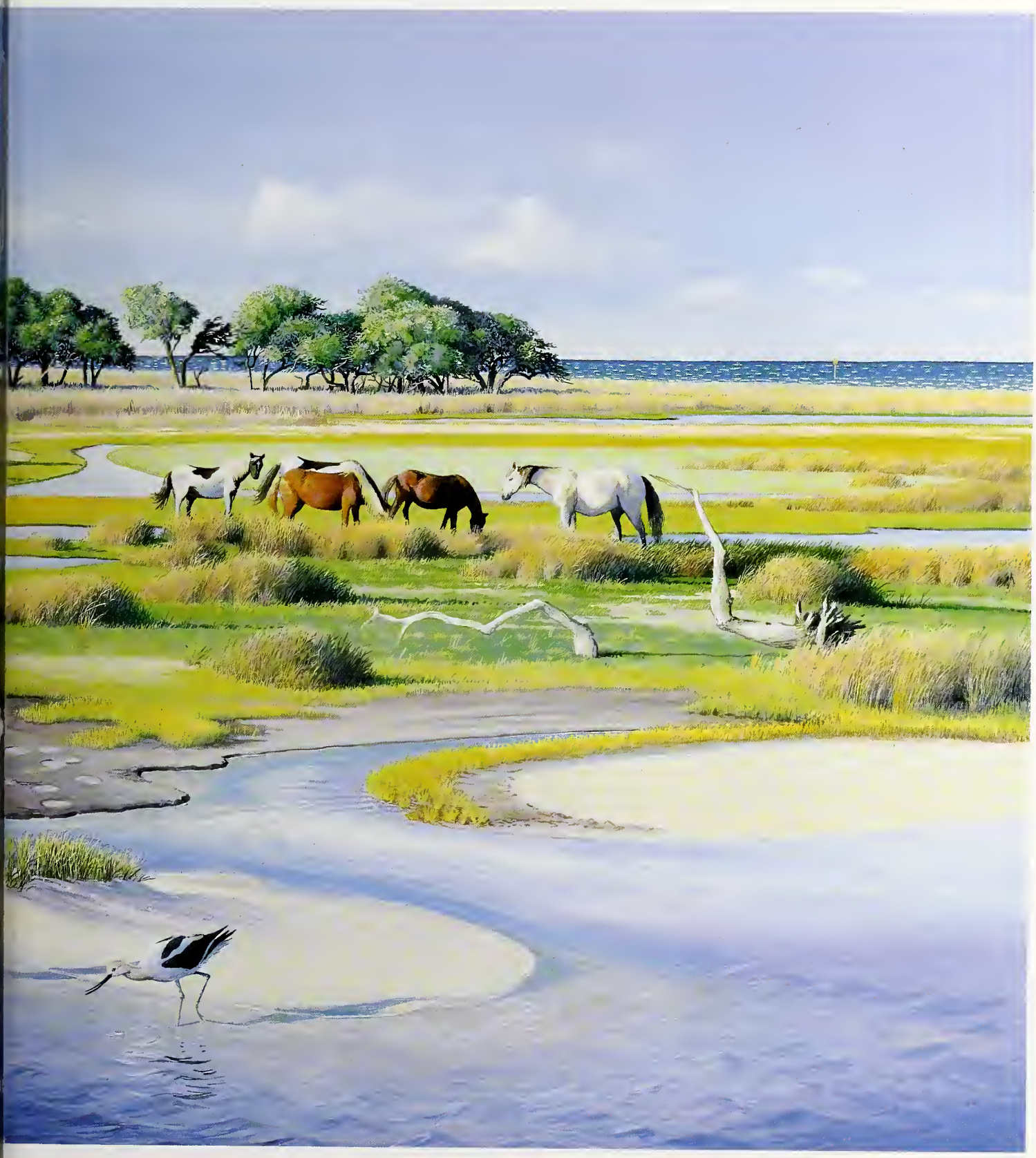
Born in Graham, North Carolina, Cheek was introduced to the coast as a child on vacation trips to Kitty Hawk and the Outer Banks. After receiving a Bachelor of Fine Arts from the University of North Carolina, he moved to Martha's Vineyard in Massachusetts. He has since returned to North Carolina, and he and his wife, Alice, run Down East Gallery, an art gallery and framing shop in Beaufort.

Cheek spends many hours onsite studying and photographing scenes, seeking unique angles for his compositions. "If you don't know your subject well, then you are working as an illustrator," he said. "That's different from producing a painting that imitates reality." He works with acrylics, often spending 300 to 400 hours perfecting the detail in his paintings. Because acrylic paint must be used on a flat surface, Cheek paints in his studio, working from memory and his photographs.

While he's been the recipient of numerous awards, Cheek admits that prestige is not what motivates him. "Unless you are doing commission work, you are really painting for yourself," he said. "The most rewarding thing to me is that people like my art and support me."

And what rewards should viewers get from his art? "Maybe these viewers aren't painters or artists, but I hope they might look at a painting and think they have looked at a scene in that way," he said. "I want them to learn to use their eyes more, to learn what that's about."

"Early Fog over Sugarloaf" *With the state port and Sugarloaf Island as a backdrop, I have depicted part of Morehead City's commercial fleet one early morning. This work was created for the North Carolina Seafood Festival.*



"Islands in Islands" *Brown's Island is located between Harkers Island and Marshallberg. Entering a small bay on the south side, I was able to capture this scene of marsh and winding tidal creeks. During my stay, I was kept under the watchful stare of the herd's stallion as well as by a group of cattle resting among the trees.*

"Ocracoke" *I came upon this old fish house on Silver Lake on Ocracoke. The warmth of light at sunset added to the timeless enchantment of this island scene. The pelicans and foreground skiff were added to complete the composition.*

"Island Refuge" *As you enter Cedar Island Wildlife Refuge on Highway 12 from Atlantic, you are immediately embraced by a sea of marsh grass divided only by the road and adjacent canals. One late January day, my wife and I were watching waterfowl, and we came upon this scene. The warmth of colors gives little indication that the temperature was about 10 Fahrenheit with a stiff Northeaster blowing—one of the coldest days of the year.*

"The Old Port Town" *I was trying to achieve a look of antiquity in this painting. From Carrot Island, the Beaufort waterfront has a "storybook" appearance. With the survey of the waterfront buildings and boats, this painting became quite an arduous task.*

DOGWOODS *in* DANGER

by Vic Venters
photography by Ken Taylor

A strange and distressing disease sweeping down the Appalachians is killing native dogwoods, but it's too early to tell whether these magnificent trees will someday become just a memory.

Take a good look at the dogwoods in these photos. Then close your eyes, let your mind drift, and try to recall how the soft whites of dogwood flowers so enliven the southern landscape during the budding months of a new year.

Yes, look closely and think hard about what you see, because in some parts of the state, old photos and memories could be all that remain of our beloved dogwood—at least for the foreseeable future. In the past several years, the deadly fungus *Discula*, also known as dogwood anthracnose, has been sweeping south, devastating dogwood populations in its path.

Because the disease appears to be so new, plant pathologists and botanists have yet to answer many of the questions concerning disease origins, how and where it spreads, and how severe the final consequences of that expansion will be.

One recent finding, however, has potentially serious long-range implications. Acid rain has recently been linked to the cause of the disease, and enough research has been completed to at least illuminate a few facts.

Initial symptoms of the disease are small, purple-rimmed spots or tan blotches that appear on the leaves of both young and mature trees. As the fungus spreads, twigs and branches are infected, then killed. When new foliage appears the following spring, the fungus reinfects the succulent shoots. The disease also causes water sprouts and cankers on the main stem, and in four or five seasons the tree dies. (Lest you panic, dogwood anthracnose should not be confused with spot anthracnose, a very common disease with similar initial symptoms. However, spot anthracnose usually does not progress beyond the leaf spotting stage and is not fatal.)

The consequences for dogwoods where *Discula* has spread read as a litany of horrors for botanists and plant lovers alike: In Catoctin National Park in Maryland, once renowned for its spring dogwood displays, mortality among the park's dogwoods rocketed from 20 percent to 90 percent in only three years. In Pennsylvania, 50 to 70 percent of the forest dogwoods have perished in the eastern part of the state in the past decade and many more are infected.

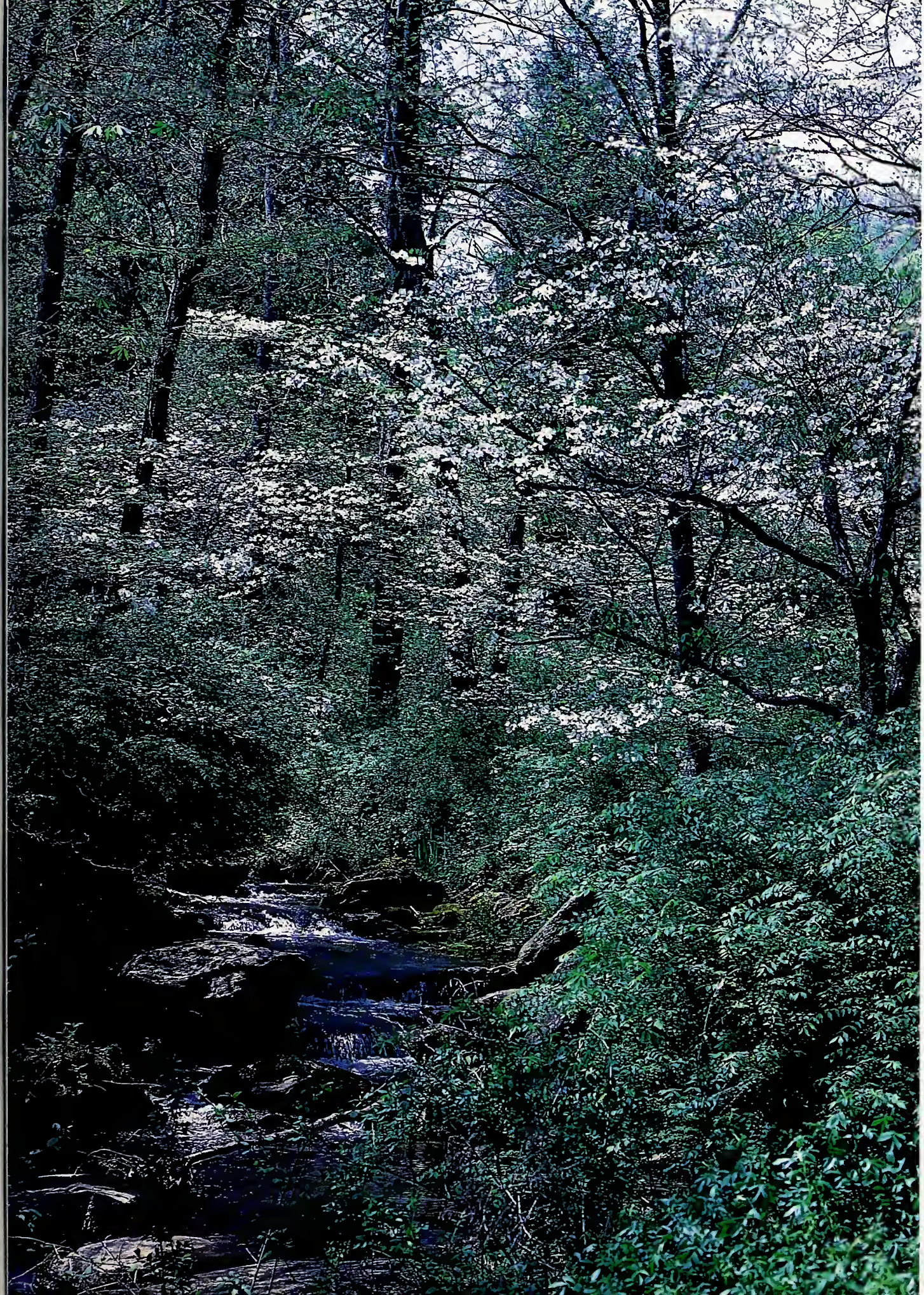
Dogwood anthracnose was discovered in the Pacific Northwest and Northeast in the mid-1970s and it quickly fanned out in those regions. By the mid-1980s, it began its inexorable march south, spreading into North and South Carolina, Virginia, Tennessee and Georgia. The South's native dogwood (*Cornus Florida*) as well as the Pacific dogwood (*Cornus Nuttallii*) have been helpless before the disease, offering no natural resistance for defense. To some, the helplessness of our dogwoods conjures up the specter of the infamous chestnut blight, a fungus that leveled American chestnut tree populations in the 1920s, '30s and '40s.

The South without dogwoods would be a pretty bleak place. They might as well take away our azaleas, live oaks and southern belles for good measure. But before you run out and make funeral arrangements for your carefully landscaped lawn, there is some light—if not at the end of the tunnel—then at least in this picture.

So far, the disease has mostly been located in the mountain and foothill regions of the South, but it has recently been detected in the Piedmont of Georgia, only 45 miles from Atlanta. The good news for gardeners is that ornamental trees in lawn and nursery settings are much less susceptible than are stands of wild dogwood. "The disease is much more common in the wild than it is in landscapes," said Dr. Ronald K. Jones, a plant pathologist for the N.C. Agricultural Extension Service at N.C. State University in Raleigh.

A Pennsylvania study indicated that *Discula* preferred moist and humid shaded environments. "The survey showed the disease generally spread across the state, but

A southern favorite, *the flowering dogwood is North Carolina's state flower. Unfortunately, dogwoods in the region are increasingly threatened by dogwood anthracnose, a deadly fungus that has swept south from the Northeast in the 1980s. Dogwood near mountain streams (right) are especially vulnerable and acid rain has recently been implicated in the spread of the disease.*



it infected pretty specific sites," Jones explained. "Where there was a creek, a stream, or cove where the moisture was higher, those areas seemed hardest hit. The more dense the overstory and shade, the worse the problem," Jones elaborated. "Your landscape trees tend to be in the open, have more air movement around them, and the humidity dries out faster."

Research in the South supports *Discula's* predisposition in the North to grow in moist areas. "The environmental factor most apparent last year was proximity toward water," said Mark Windham, a professor at the University of Tennessee who is studying anthracnose in the Great Smoky Mountains National Park. "Trees that were close to mountain streams had a much higher incidence and severity of anthracnose."

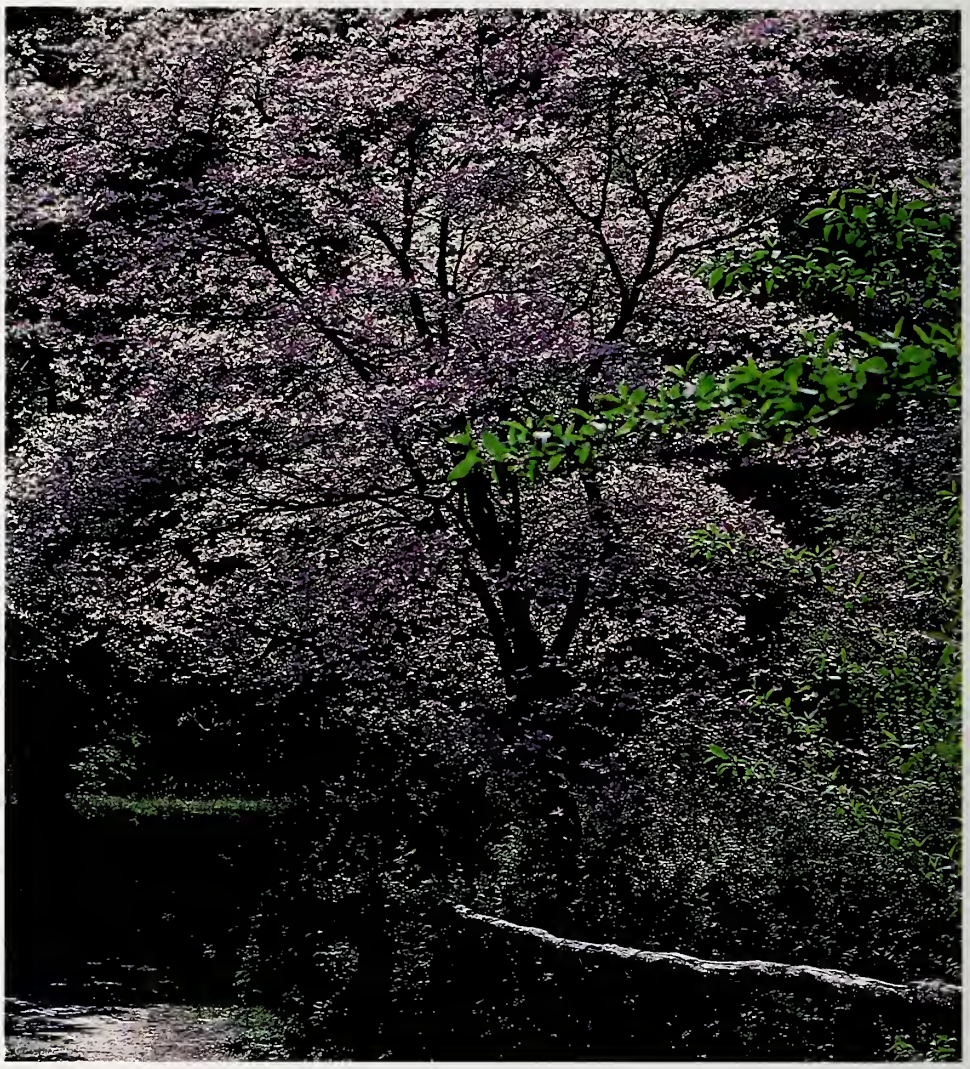
At last count, there were 69 counties infected in seven states in the South. Of that number, North Carolina has 18 counties fouled with anthracnose, and all of those counties are in the western region of the state, said Dr. Robert Anderson, a plant pathologist for the U.S. Forest Service in Asheville. Anderson is leading a cooperative project involving federal, state and university researchers that are studying the dogwood anthracnose problem in the Southeast.

Anderson's cooperators are monitoring 60 standardized test plots in the region. "In these plots, 29 percent of the trees were showing symptoms of disease, and 2.5 percent of the dogwoods were dead," he said. From this data, Anderson estimates that 1.2 million acres of forests that contain dogwoods are infected out of the total 2.3 million acres that have dogwoods on them. Dogwood stands above 3,000 feet seem especially vulnerable.

Because anthracnose doesn't kill or contaminate every tree within an infected region, this "hotspot" infection pattern poses a vexing question for plant pathologists. "I can take you to places in North Carolina where virtually all dogwoods are dead right now," Anderson explained. "Then I can take you to a place right down the road where they are all fine."

"Why is one site affected and another a couple miles away not?" asked Anderson. "We are trying to look at a site correlation for clues."

Forest dogwoods stressed by severe winters, drought, and hot summers also seem to be easy prey for anthracnose. For botanists, this raises the question of whether the disease is the result of environmental and weather factors that have transformed a previously innocuous fungus into a deadly tree killer, or, whether anthracnose was introduced from abroad.



***The South's native** dogwood* (Cornus Florida) *has shown no resistance to the ravages of dogwood anthracnose. However, cultivated dogwoods (above) have proven more resistant to the fungus than trees found in natural settings.*

"There is not a lot of evidence to support that it was introduced, but certain characteristics point in that direction," Dr. Jones explained. "It does attack native species and there doesn't seem to be any resistance. However, the oriental species (*Cornus Kousa*), does seem to be resistant." Another finger pointing at the introduced-pathogen theory was the almost simultaneous appearance of the fungus near ports of entry in New York state and the Pacific Northwest in the 1970s.

However, some plant pathologists also believe that the extreme fluctuation in the weather patterns of the 1980s weakened many trees and left them open for attack. As this theory goes, the subsequent spread of the disease may have had a steamroller effect by creating more spores to infect more trees, thereby increasing the severity of each infection cycle.

Botanists now believe acid rain may be playing a substantial role in the spread and severity of anthracnose infection. This summer, under simulated laboratory conditions, researchers found there was a correlation between the fungus and acid rain. "The more acidic the rain, the more severe the damage," Anderson explained.

The origin of anthracnose is not the only puzzle for botanists. While it is known that the fungus spreads over short distances by rain-dispersed water splashes, its long-distance transmission mode is unknown.

Birds are one suspect for long-distance transmission. This fall, Windham and his research team in the Great Smokies will begin studying birds that utilize dogwoods. "We will be testing their droppings and testing to see if they are picking up the fungus spores on their feet," Windham explained. "Birds eat the seed and the fungus can be isolated from the seed. This may be a way it is spreading."

"Our evidence from the West Coast shows the disease had a north to south,

***Dogwoods in our** mountain forests (above) have suffered the brunt of dogwood anthracnose infection. The disease strikes hardest in cool, moist locales several thousand feet in elevation. So far, the disease has not appeared in the state's Coastal Plain, though plant pathologists fear it may spread to the Piedmont.*

south to north spread," Windham said. "There was not so much an east to west pattern. This north to south route follows the migration patterns of the birds."

Ironically, if birds are spreading the disease, they could literally be seeding the ruin of many wildlife species. Over 50 species of animals and birds utilize dogwood seeds and browse for food. Dogwood fruit has been shown to be a preferred food of wild turkey, and it is heavily utilized by ruffed grouse and quail. White-tailed deer and other mammals also eat foliage and fruit. Other users of dogwood include the mockingbirds, robins, cardinals, bluebirds, warblers, thrashers, thrushes, grosbeaks and woodpeckers.

In heavily infected Pennsylvania, biologists think the impact of dogwood anthracnose on wildlife food has been minimal. But that's because other browse for deer and high energy foods for birds are readily available in that state. In southern states, however, studies have shown that dogwood fruit makes up a significant portion of wild turkey diets, and it is especially important to deer in southern forests because of its abundance. Right now, it's not known what will happen to southern wildlife populations if forest dogwoods stands are devastated. "The implications for wildlife could be severe if they are depending on dogwoods as a high-energy food source in the fall, because one of the first things affected is the reproduction of the seed," Windham explained.

How far will the fungus spread, and how serious a problem will it become? Unfortunately, plant pathologists simply do not know yet. "It's a question we really don't have a good answer for," Anderson explained. "At least in the mountains and Piedmont, we have no reason to suspect that it's not going to cause major damage, and in some cases it already has."

Unfortunately, anthracnose seems to be slowly spreading out of the mountains. "Right now, we are only finding it in the mountains," Windham said. "However, we have seen evidence this spring of it moving down in elevation in Tennessee."

In our Coastal Plain, there have been no observed infections. "At this time, there is a wait-and-see attitude," Anderson said. "Anthracnose does prefer cool, wet weather, so the hot, dry summers may stop the fungus from being active there."

Because of the here-and-there nature of anthracnose infection, most botanists are still hesitant to label *Discula* another chestnut blight. "That disease attacked every chestnut tree in sight. It didn't skip valleys, it didn't skip coves, it didn't skip hilltops," Anderson said. "Anthracnose has not done that. It's been in Pennsylvania for 10 years now, and half the dogwoods are dead, but half are not. However, if dogwoods within these infected areas are subjected to this fungus for 50 years, it may take a major toll," Anderson elaborated. "But in the short term, it doesn't look like its going to kill every dogwood in sight."

While all of the answers are not in, the mounting losses of dogwoods testify that the disease is serious. Concerned botanists have begun a program to cross the American dogwood with the oriental dogwood to produce a disease resistant strain that will readily adapt to our southern forests. While a cross has been developed, the resulting dogwood is usually sterile and it may be 15 or 20 years before a self-reproducing strain is genetically feasible. "That may be too late," Windham adds.

In the meantime, care for your ornamentals as though they were your child. For memories' sake, perhaps you'd better savor the sight of those dogwoods you see in the wild. If you live in the mountains, look quick, for sometime in the future Dixie may never be the same.

What To Do

Ornamental dogwoods have fewer problems with dogwood anthracnose than do wild trees. Gardeners can take these measures to help prevent or delay *Discula* infection.

1. Water trees during drought periods. However, be sure not to splash water on leaves as this can spread disease.
2. Mulch.
3. Avoid injury to the plant.
4. Increase air circulation by pruning away surrounding vegetation.
5. Prune off succulent shoots and burn dead branch materials.
6. Rake and burn leaves.
7. Fertilize your dogwoods but avoid high nitrogen fertilizer which encourages the growth of vulnerable new vegetation.
8. Spray with registered fungicides containing thalinol, moncozeb or benomyl.

The Quiet Majesty Of

There's plenty of room to roam, camp and fish throughout the more than 7,000 acres of this unique, but lesser known, mountainous state park at the edge of the foothills.

by Kay Scott
photography by Ken Taylor

We were climbing steadily toward High Shoals Falls. It seemed a little strange to be hiking *up* a mountain to reach the *bottom* of a waterfall, but that's what we were doing. Through the trees we could see rhododendron growing along the banks of Jacob's Fork River. Then we crested the hill, stepped across to a large boulder and felt the cool air sweep up through the draw below us. Almost 80 feet above, crystal-clear water began its descent to the large, moss-covered boulders at the base of the falls. In a deep pool just below the falls, several happy children and one large, very thankful long-haired dog were resting on rocks after a swim.

The unexpected beauty of the scene took my breath away. None of the mountains that make up South Mountains State Park is more than 3,000 feet high, yet the park has the feeling of a wilderness. It's a pleasant surprise because the little-visited park is located in one of the state's most populous areas. From Morganton, my hometown, South Mountains is a 20 minute drive; from Charlotte, the state's largest metropolitan area, it's little more than an hour's drive.

And from the park's highest point, Benn's Knob (2,890 feet), you can see the silhouette of North Carolina's true high country — Grandfather Mountain, Mt. Mitchell, Table Rock.

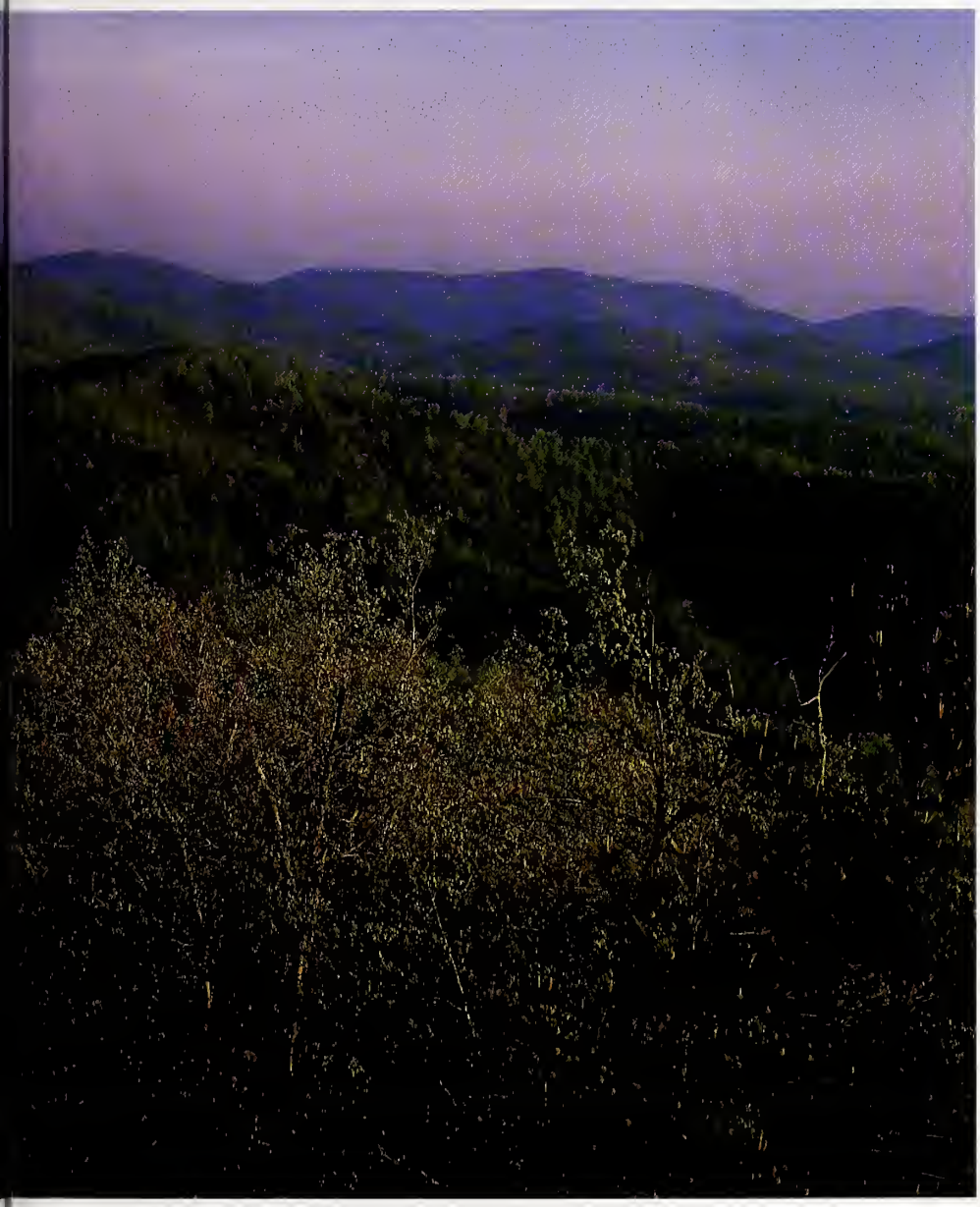
South Mountains State Park is a land of solitude and gentleness. It's a place to slow down and enjoy nature while fishing for trout, hiking with your family, picnicking near the river's edge or riding either horse or mountain bike along abandoned mountain roads.

High Shoals Falls is the primary scenic attraction in the park. However, it's not the falls, but the water itself that is this park's most unique natural feature. The uniqueness of this resource was recognized in the 1940s when the first of three separate studies recommended that a park be established in the South Mountains to protect the area's watersheds. In December 1974, 5,779 acres of the Jacob's Fork watershed were purchased and the state park was formed. Later, the park was expanded to its current 7,189 acres.

Water in Jacob's Fork and its tributaries inside the park is categorized as Class A, the purest surface water which can be found. The goal of this park is to control the watershed to keep the water as pure as possible for as long as possible.

Several tributaries of Jacob's Fork flow through the state park. And, aside from High Shoals, there are two or three smaller falls and a couple of deep gorges located in the park. According to Walter Gravley,

SOUTH MOUNTAINS



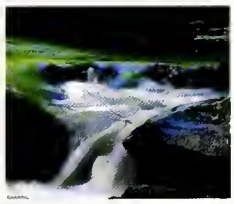
***Though only** an hour from downtown Charlotte, the rolling topography of South Mountains State Park contains areas of near wilderness.*

Superintendent at South Mountains, "As it is, about the only people who see some of these other waterfalls and gorges are fishermen. There really aren't trails into some of these other areas." He was quick to note that, for the adventurous, the park does allow off-trail exploration.

However, that Sunday, my companion and I were more interested in a relaxing hike than in backcountry bushwhacking. As we started walking back from High Shoals Falls, we noticed that almost every park visitor had a fishing rod in his hands. Fishing is a major activity in this park, according to Gravley. "We have 14 miles of trout waters, 12.5 of which are native waters. The remainder are general waters stocked by the N.C. Wildlife Resources Commission.

"Our trout waters are some of the easternmost in this part of the state," he continued. "Most of our native waters are fairly productive while some streams are marginal for trout. In fact, if you go just below the park you run into good smallmouth fishing. It's not unusual for sportsmen on some stretches of water to catch both smallmouth and trout."

We continued our exploration of the backcountry on the old logging roads which form the majority of trails in the park. It wasn't until 1983 that there was a serviceable road into the park. Before, access was by a 4-wheel-drive. In the years just prior to the upgrading of the road, park visitation ranged from only 8,000 to 10,000 per year. "The first year after the road was completed, we had 32,000 visitors," Gravley explained. "Since then our visitation has increased to between 50,000 and 60,000 per year. That may sound like a lot, but, compared to other state parks, we're still one of the least visited."



"The kind of visitor we get at South Mountains is a little different from the average visitor at some other state parks," said Gravley. "Although we're one of the least visited state parks, on the average, the visitors we get stay longer than at some of the others."

The park's holdings are only part of a larger assemblage of public and private lands totaling more than 20,000 acres in the South Mountains area. The majority of these lands remain wild. The park is bordered on its west by the Morganton watershed and on its east and north sides by the Wildlife Commission's South Mountains Game Lands, leased from Champion Paper Company. To the south are Rawlings Timber Company properties. This combination of undeveloped lands provides a significant natural habitat for wildlife.

As we approached the campsites, we were startled by a large copperhead that crossed the roadbed directly in front of us. I had been warned that sightings of these snakes are so common in this park that they have given it a somewhat infamous reputation. "It is uncanny how many reptiles our park visitors see," confirmed Gravley. "In fact, it's quite a contradiction. The snakes are the one thing that everyone is afraid of and, at the same time, the one thing which almost every park visitor wants to see!"

We stopped along Shinny (pronounced Shiny) Creek near the campsites for lunch. The creek's name comes from the days when this was a popular area for moonshine production. According to Gravley, many of the names in this park stem from Prohibi-

tion days when making "shine" was a popular and lucrative activity for local residents. Apparently, the moonshiners appreciated the water here as much as the park's founders. I certainly appreciated the water as I took off my hiking boots and wool socks long enough to dip my hot, tired feet into the welcome coldness.

Just across the campsite, we turned right onto Shinny Trail. This path is a little different from many others in the park because it is a trail rather than a converted logging road. Both hiking and horseback riding are popular activities in the park. Including boundary area roads, the park has 39 miles of moderately strenuous hiking and/or bridle trails. According to Gravley, "Because of the nature of the park's terrain, every trail has about a quarter mile to a half mile of steep grade on it. The obvious reason is that you have to get from the valley floor to the ridge line.

"We currently allow [non-motorized] mountain bikes on the 25 miles of bridle trails because these old roadbeds have a good gravel composition which resists erosion," he continued. "In fact, many mountain bikers combine the park's roads with logging roads and other dirt roads around the park for an enjoyable and challenging ride."

The Shinny Creek Trail is limited to hikers. It led us into mountain-type terrain and vegetation. Forest types in the park range from pure conifer to mixed conifer-hardwood and climax hardwood stands. Oaks, hickories, white pines and various yellow pine species are predominant. It has plants from both the Piedmont and the deep mountains, making for interesting hiking for the amateur naturalist.

Several species of wildflowers and shrubs are found in the park, usually along the banks of the streams. Jack-in-the-pulpit, lady slippers and foam flower are a few of the more abundant wildflower species. The most obvious shrub species are mountain laurel and three species of rhododendron-rosebay or white rhododendron, purple or Catawba rhododendron and Carolina rhododendron.

PARKS AND RECREATION

***Cascading 75** feet to a rocky pool below, High Shoals Falls is the highlight of a trip to South Mountains. Thirty-nine trails are available to hikers in the park, including one that leads to a cooling dip in the pool.*

***The east-and-west-trending** South Mountains range contains plants from both the Piedmont and the mountains.*

"In addition, we have found four threatened and endangered species in the park," states Gravley. "These include bear oak and a species of pine sap (a member of the Indian pipe family)."

We hiked along the Shinny Trail until its intersection with the Headquarters Road and then began our trip back. Occasionally, we would catch glimpses of the sheer walls of rock in the gorge below.

According to Gravley there is still some debate about whether the South Mountains are a separate range or if they are a part of the larger Blue Ridge. One reason for this debate is that the South Mountains range runs east to west while the Blue Ridge runs north to south.

Thinking about the more familiar Blue Ridge and the Indian activity in some of its areas led me to wonder if this park had once provided a haven for these early residents of this state. Gravley stated that there was not a lot of Indian activity in the South Mountains. Archaeological and historical studies determined that this range served as a barrier between the Catawba Indians to the east and Cherokee to the west.

"White men first came to this area in the early 1800s," he continued. "The park is dotted with early homesites which date from that time. In fact, part of the foundation of a large grist mill which was located at the top of the High Shoals Falls is still visible."

At last, we returned to our car. The parking lot was almost full of cars that afternoon, most of them sporting license plates with the familiar "First in Flight" slogan on it. It seemed that only Tar Heel locals had discovered this area.

South Mountains State Park challenges visitors to slow down, relax and remember their true place in the scheme of life. It's a rare place because it seems to remind you that there is more than enough time to stop and enjoy life. But, one wonders if there is more than enough time for this land and for the precious clean water that it shelters.

Currently, the public and private lands around the park provide a more than adequate buffer against development. However, that could change.

In *A Sand County Almanac*, Aldo Leopold says, "Like winds and sunsets, wild things were taken for granted until progress began to do away with them." South Mountains State Park and the undeveloped lands which surround it are a great resource for this state. Let us recognize the subtlety and treasures of such wild areas — there are very few of them left. ⊠

South Mountains State Park

Camping in South Mountains State Park is available to the backpacker in four different sites. Camping fees per night are: families/individuals - $3.00 per site (maximum of 6 people per site); organized groups of 10 people or less - $5.00 per site: organized groups of 10 people or more - $5.00 + $1.00 for each person over the 10th person.

Jacob's Fork Picnic Area is located next to the parking area. It's accessible to the handicapped and features 12 tables, nine grills and a restroom. The Shinny Creek Picnic Area is located four-tenths of a mile from the parking lot. This area has four tables, three grills and a pit toilet.

Fishing is permitted on the 12.5 miles of native and general waters in the park. All North Carolina fishing regulations apply and are enforced.

The park is open year-round during the following hours: June – August, 8 a.m. – 9 p.m.; April, May, and September, 8 a.m. – 8 p.m.; March and October, 8 a.m. – 7 p.m.; and November – February, 8 a.m. – 6 p.m.

The rangers at South Mountains State Park are happy to schedule special interpretive programs for groups upon request. To schedule a program or for further information call: 704/433-4772.

Exchange Also Helps Canadian Breeding Habitat

Projects Funded To Improve Waterfowl Habitat At Pamlico, Roanoke

Written and Edited by Vic Venters

As North America's duck populations continue to plummet, finding ways to protect waterfowl habitat is becoming increasingly important.

That's why the N.C. Wildlife Resources Commission has joined federal and state agencies and private conservation groups in contributing to a pool that will fund the protection of critical breeding habitat in Canada. In return for its $60,000 contribution, North Carolina will receive an equal amount of money to be spent on waterfowl projects within the state's own boundaries.

The exchange of money is necessary because regulations make it difficult for federal wildlife funds to be spent in Canada.

CURTIS WOOTEN

Sunset Or A New Dawn?: *Under the auspices of the North American Waterfowl Management Plan, the N.C. Wildlife Resources Commission, federal and state agencies, and private conservation groups are working to ensure that the sun never sets on the sport of waterfowl hunting. The Commission plans to spend $60,000 from a national fund to improve waterfowl habitat in eastern North Carolina this year.*

However, funds from state agencies can be used. The National Fish and Wildlife Foundation administers the pool.

Biologists have identified three areas in eastern North Carolina where the exchanged funds will be spent.

- $50,000 will be used to consolidate wetlands around the Pamlico Point gamelands area.
- $5,000 will be used in the Roanoke River Wetlands to construct experimental wooden dikes — which disturb little wetland habitat — to create impoundments.
- $5,000 will be used to clear timber and create openings to attract waterfowl in the flooded impoundments in the Roanoke River Wetlands area.

The North American Waterfowl Management Plan is an attempt to reverse the decline in populations of ducks and geese.

— Angela Dorman Hill

Half-Wild Browns Survive Better Than Pure Hatchery Strains

In the Roman Empire's glory days, a favorite pastime was a trip to the Coliseum. When not watching lions dismember religious dissidents, jaded citizens witnessed thousands of contests featuring tigers against bears, lions fighting elephants, and so on. A gruesome spectacle, to say the least, and, as records have shown, devastating to the known world's animal populations.

Today, fisheries biologists in North Carolina and the Southeast have pitted fish against fish for an altogether better purpose. In 1987 and 1988, N.C. Wildlife Resources Commission biologists placed half-wild brown trout fingerlings in streams side-by-side with domesticated hatchery trout to determine which strain showed better survival characteristics in the wild.

The hatchery trout were about 6½ inches long and fat from a steady diet of trout chow. The half-wilds — a cross between wild male browns and hatchery female browns — were leaner and about an inch shorter because of their inability to easily convert to hatchery conditions. The trout were placed in eight streams in North Carolina and Virginia, and while the two strains didn't actually fight each other, they were competing for food and cover in the nutrient-lean Appalachian waters.

Biologists had long suspected that half-wild fish would survive better, but no statistical analysis had been completed to answer questions about the comparative performance of the two strains. Biologists needed this information in order to decide which strain to use in stocking programs for streams with poor or non-existent natural brown trout reproduction.

The streams were monitored quarterly by electro-fishing, and, as you might guess, the study confirmed the biologists' initial hunches. In the North Carolina streams, only 6.7 percent of the domestics survived their first year, while almost 10 percent of the half-wilds survived. The Virginia streams showed similar results. Additionally, the half wilds were in better condition at study's end, with their body weight remaining the same relative to their body length. The hatchery strains, however, had actually lost weight relative to their body length. The docile hatchery fish, used to nutritious — but easy to catch — trout pellets, proved to be poor feeders in the wild.

While the results showed that half-wild browns are an excellent tool for establishing self-reproducing trout populations in some streams, biologists warn they are not a panacea for poor-water quality conditions. Trout survival — regardless of strain — was extremely poor if adequate habitat or clean water did not exist.

Former Chairman Receives Award

New Wildlife Commissioners Appointed By Governor

Eugene Price, former chairman of the N.C. Wildlife Resources Commission, was awarded the Order of the Long Leaf Pine in May by Governor Martin during the swearing in ceremony for new wildlife commissioners.

Price, first appointed by Gov. Martin to the Wildlife Commission in 1985, was presented the award for his service as former chairman. He is one of the 13 members appointed to the new Commission set up this year by the state legislature at the request of Gov. Martin. The new Commission unanimously elected Robert E. Barnhill Jr. chairman and Price as vice chairman.

Under the new law, all terms of office for the previous commissioners expired in April and the Governor was given the authority to appoint a new commission. The General Assembly has also appointed two new members — including the first woman ever to sit on the Commission.

— *Angela Dorman Hill*

KEN TAYLOR

New Wildlife Resources Commission: *Eleven of the 13 new members of the N.C. Wildlife Resources Commission pose outside the State Capitol after taking their oaths of office in ceremony with Gov. Jim Martin. From left are: Maughan Hull Jr. of Pasquotank County (District 1); R.G. Sowers III of Pender County (District 2); Richard P. Budd of Davie County (District 7); Stuart Paine of Moore County (District 6); Eugene Price of Wayne County (District 3); Joseph Neisler Jr. of Cleveland County (District 8); Robert Barnhill Jr. of Edgecombe County (at-large); Richard Jarrett of Alamance County (District 5); Susan L. Allen of Wake County (appointee of House Speaker Joe Mavretic); Ferrell Blount of Pitt County (at-large); Dr. William H. McCall of Buncombe Co. (District 9).*

Not pictured are Ted Lockerman of Sampson County (District 4) and Ovide de St. Aubin of Chatham County (appointee of Lt. Gov. Jim Gardner).

MELISSA McGAW

New Chairman: *Robert E. Barnhill Jr., a Tarboro contractor, was reappointed by Gov. Martin as an at-large commissioner and was unanimously elected as chairman of the new Wildlife Commission.*

MELISSA McGAW

For Meritorious Services: *Former Wildlife Commission chairman Eugene Price receives the Order of the Long Leaf Pine from Gov. Martin. Price was reappointed to the Commission and was elected vice chairman.*

Angler Would Really Prefer a Walleye

New State Record Muskie Gave Fisherman A Real "Run"

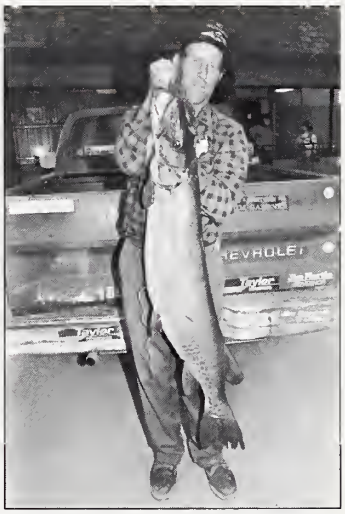
Angler Dale Hogue of Bryson City says he doesn't much like to "get hold" of a muskellunge when he's fishing. "I've had three rods broken and three reels stripped," Hogue confessed. "They're kind of hard on light tackle."

You see, Hogue is a walleye fisherman, and a "pretty fair one" at that, he'll concede with some modesty. As it turns out, he seems to be a pretty fair muskie fisherman as well.

In March, Hogue landed a 38-pound pure strain muskellunge to set the new state record. Hogue hooked the fish in the Little Tennessee River above Fontana Lake on a small green twister jig as he was casting for walleye. "The fish took off downstream for about a quarter of a mile," he recalled, adding that he followed in hot pursuit.

He had to run to keep up with the brute; his tackle was a spin cast reel spooled with only 100 yards of 8 lb. test line. At one point in the nearly two-hour battle, the fish headed for the bottom and refused to budge. "I knew if I pulled on the line, I'd break it," he explained. "So I picked up a rock and threw it in on top of the fish to get him moving. I finally worked him down."

While this wasn't Hogue's first experience with muskies, it was his first successful one. "I've had 11 muskies on before," he said. "Two or three weeks before I caught that one, I had one run all the line off my reel and pull off." Although his state record fish didn't break his rod or reel, Hogue said the fish is still costing him plenty of money—$182 in taxidermy costs. "But I guess it's worth it."



Massive Muskie: *Angler Dale Hogue of Bryson City battled this new state record muskie for 1 hour and 45 minutes before landing it from the Little Tennessee River above Fontana Lake. The 38-pound fish was 52¼ inches long and had a girth of 23 inches.*

Mockingbird Phones Home

Mystery Caller Hangs Up

Dear Editor:

As a native Tarheel, I was glad to retire in North Carolina after spending most of my life in the Midwest. Honeysuckle, fragrant in the morning dew; four-o'clocks tumbling over the back steps; and a mockingbird singing from his chimney-top perch all combined to make me feel at home.

However, I missed something I had enjoyed in the Midwest: a telephone with a whistle-like tone instead of the usual ring. Our local telephone company told me they didn't carry this type so I accepted one with the traditional bell-ring. To my delight, a parcel arrived one day from friends in Nebraska that contained a phone with the birdie whistle that I liked.

But a problem arose. The whistle would sound, but by the time I could answer the call, I would find no one on the line. For several days I thought perhaps my friends were "reaching out" and would hang up before giving me time to answer. It took my sister's keen ear to discover that the cause of my frustration was Mr. Mockingbird, sitting on our neighbor's chimney, heartily mimicking my new phone's whistle.

Ruth Ingram
Asheville

Cast Us A Line...

If you'd like to share any unusual stories about wildlife or comment on the magazine or conservation issues, let's hear from you. Letters should be 150 words or less. We reserve the right to edit any correspondence. Please send to Letters Dept., *Wildlife in North Carolina*, 512 N. Salisbury St., Raleigh, N.C., 27611

Angler Bags Big Owl On Hula Popper

There's no telling what will happen on a fishing trip. No one knows this better than Alan Goldman of Raleigh, an avid fisherman who wrote to tell us that his sport has taken a new twist.

"Sometimes one's career or hobby suddenly takes on a new direction," Goldman wrote. "This seems to have happened to me lately in my fishing. In late October while fishing for blues off the coast of North Carolina, I managed to entangle seagulls in my line on two different occasions. Luckily, I was able to free both birds. Then one day in November, I went fishing for largemouth bass at Falls Lake near Raleigh. It was about 5:15 in the afternoon, and the sun had set. I was popping a Hula Popper along the surface of the water near the end of a long, quiet cove when I suddenly heard the whirring sound of wings. I looked up to see a large gray owl heading for my lure. The owl swooped down and missed the Hula Popper, but of course became entangled in my line. He tried to get away and was pulling the line out of my reel, so I began to reel him back in. However, as he came close to the boat, I decided this was a bad idea. He settled into the water and began to flutter away from me. So, I gave the line a jerk and it came off him. The owl fluttered along the surface for another 20 or 30 seconds, and then took off. He landed in a small, dead tree, and sat staring at me for perhaps 30 seconds. Then, spreading his wings, he flew off into the woods.

"I've thought about this a lot lately. As some of my friends have pointed out, the next time I want some fish I should probably go bird hunting."

Calendar of Events

On several occasions, events in this calendar have been changed or canceled without notice. Readers should check the contact before traveling to an event. Listings for the calendar should be sent at least four months in advance.

August 17
Strange Seafood Exhibition at the N.C. Maritime Museum in Beaufort. Unusual seafood dishes — from sea urchins to sea lettuce — will be featured. For more information write the N.C. Maritime Museum, 315 Front Street, Beaufort, N.C., 28516 or call 919-728-7317.

August 16-20
The 30th National Trout Unlimited Convention at the Great Smokies Hilton in Asheville. "This is a working convention, and it's an excellent chance for any TU members to sit in on any committees and see what TU is doing nationally," said Frank Smith, a national director-at-large for Trout Unlimited. For more information contact TU Convention, Box 117, Asheville, NC 28802.

August 25-27
Carolina Outdoor Festival at the N.C. State Fairgrounds in Raleigh. "It will be a fun and educational event for the whole family," said Michael Corcoran, director of the N.C. Wildlife Federation, the conservation group sponsoring the event. "There will be over 200 outdoor-related exhibits, displays and seminars." Proceeds go to benefit the Federation's conservation programs. For more information contact the N.C. Wildlife Federation, PO Box 10626, Raleigh, NC, 27605 or call 919-833-1923.

Dog Smell Like A Skunk?

Try This Reader's Remedy For Dog's "Odoriferous Condition"

Dear Editor:

I especially enjoyed the article "Night of the Living Skunk" in your February issue. I'd like to contribute another very effective remedy for skunk odor which a friend and I discovered accidentally.

We were preparing to leave my friend's cottage at Hungry Mother State Park near Marion, Va., when my large collie chased a skunk into a culvert. We couldn't put the dog in the car in his odoriferous condition. The only remedies suggested in my friend's Girl Scout manual were the usual: smoking over a fire or burial for three days — neither suitable for dogs. Improvisation was necessary. My friend searched her cabin. No tomato juice, no vinegar. But she came up with something much better. (I had to apply it because Lucky was my dog!) I poured a full bottle of Airwick over the dog, then patted handfuls of baking soda onto his damp coat. We put Lucky in the trunk of the car, wedging the lid partially open and tying it down securely. After driving the 25 miles to where I lived at that time, we opened the trunk and found to our amazement there was no trace of smell in the trunk or on the dog. True, he was frothing at the mouth from licking the baking soda, but seemed none the worse for that.

I propose that this method be called the "Carrie Sanders Skunk Deodorizing Treatment."

Jean Lowry
Greenville

Chevron Honors Eddie Bridges

Former Wildlife Commissioner Eddie C. Bridges was honored this spring as a recipient of a Chevron Conservation Award in the citizen volunteer category. Bridges was recognized for his crucial role in founding the Commission's Wildlife Endowment Fund, which has grown to more than $17 million since its inception in 1981. In acknowledgement of his environmental and conservation achievements, Bridges received a bronze plaque and a $1,000 honorarium as part of the award.

KEN TAYLOR

Awarded: *Former Commissioner Eddie Bridges received Chevron's Conservation Award for his conservation achievements.*

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on May 31, 1989

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	46,905	$16,437,679.32
Lifetime Hunting License	464	124,040.31
Lifetime Fishing License	3,587	758,644.85
Lifetime Subscriptions to Wildlife in N.C.	1,603	215,396.62
Contributions	—	152,091.54
Fund Total	52,559	17,687,852.64
Total Interest Earned	$4,266,620.18	

Carcass Used In Study

Biologists Want Dead Drum

Just as the broiling sun of late summer fades to the cool breezes of fall, coastal fishing for red drum heats up. It's time to head for the surf with your rod and marvel at the surging runs of these powerful fish.

There should be drum for your cooler, but the N.C. Division of Marine Fisheries is asking that you also donate a few. Not whole fish, mind you, just their filleted carcasses.

As part of a five-year study on the reproduction, growth and migratory habits of red drum, Marine Fisheries is asking anglers to return the remains of any drum over 5 pounds to selected drop-off sites. From the recovered drum, fisheries biologists will analyze the reproductive organs and otoliths (ear stones) to determine the age, sex and condition of the fish.

"Ultimately, we want to find out more about when they mature and when they spawn," said Jeff Ross, project leader and biologist for the drum study. "These basic biological facts need to be understood to properly manage the fish."

Red drum are popular with commercial and recreational fishermen, and populations have plummeted in recent years along some South Atlantic and Gulf Coast states. However, Ross said there is insufficient data to determine whether there have been declines in North Carolina fishery stocks. Even so, drum under 14 inches and over 32 inches are managed under restrictive harvest regulations in the state.

Carcasses can be dropped off at Pelican's Roost in Hatteras Village; at Red Drum tackle shop or Dillons Corner in Buxton; at Frank and Fran's Tackle Shop in Avon; or at the Marine Fisheries office at the N.C. Aquarium on Roanoke Island. For more information call the division toll-free at 1-800-682-2632

1989 Waterfowl Print Available

The 1989 North Carolina duck stamp features Louis Frisino's snow geese. Prints are available at selected galleries statewide. For the gallery nearest you, write or call Sport'En Art/Midwest Marketing, RR #3, Sullivan, Illinois 61951, (217) 797-6354.

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Dawn Sentinels

Sunrise silhouettes the birdlife and stark trees in a rookery on the Cape Fear River, making these white ibises appear black against the rosy sky.

LITHOGRAPHY BY EDWARDS & BROUGHTON COMPANY, RALEIGH, NORTH CAROLINA

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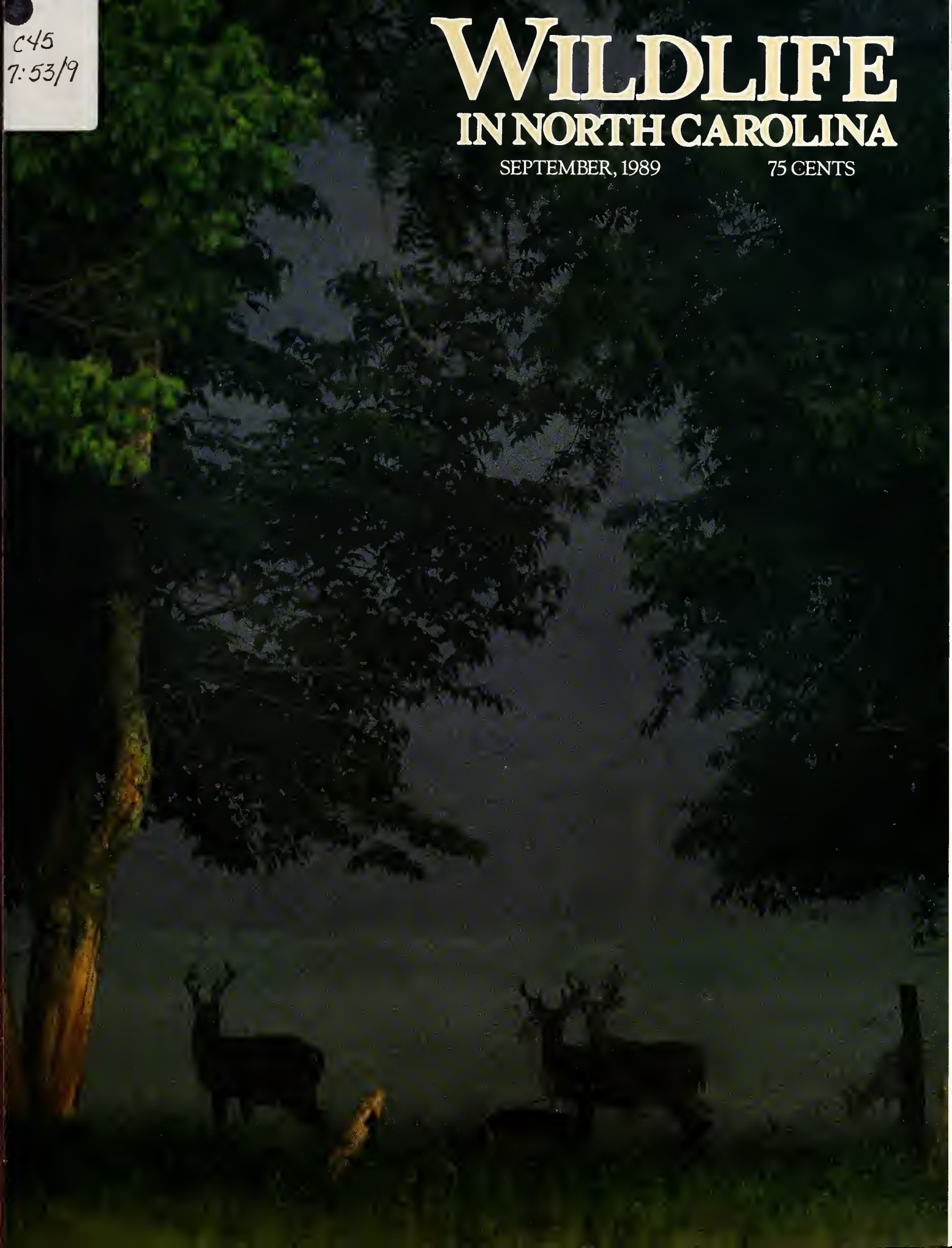
WILDLIFE IN NORTH CAROLINA

SEPTEMBER, 1989 75 CENTS



Fishing With Factoids

by Jim Dean

Some years ago when Norman Mailer wrote a book about the late Marilyn Monroe, critics took him to task for altering various facts about her life. Mailer, as expected, had an explanation. The well-known author of novels and essays said that the portions he had fabricated were "factoids," a term he neatly coined for just this occasion. A factoid, it turned out, describes the way things would have happened if they had actually happened.

Critics simply shook their heads in astonishment at this outrageous explanation, but that's because few critics ever go fishing. I don't know if Mailer has ever touched a rod and reel, but one thing is certain. He has the heart and soul of an angler.

REX GARY SCHMIDT

All fishermen are well-acquainted with the concept of factoids, and we owe a debt to Mailer for finally giving this ancient practice a name. By entering the thought processes of any fisherman, you can readily see factoids in action. "Okay, so I did not actually catch a big largemouth bass. If I had caught one, however, I'm quite certain it would have weighed 8 pounds. Besides, no one was watching, so that's how big I'm going to tell everyone it was."

Factoid fishing can be traced to the dawn of humanity when some caveperson first dragged a fish back to his or her cave. It is no leap of faith to assume that shortly thereafter, one of our early ancestors must have dryly observed that "The only time a fisherman tells the truth is when he calls another fisherman a liar."

Bass, trout and other scaled trophies are not the only creatures capable of gaining length, girth and weight long after their souls have departed. In the absence of witnesses, a piddling forkhorn buck downed by a lucky shot will grow a quite presentable set of antlers by the time its demise is recounted. Likewise, a lowly bufflehead shot while skidding into the decoys is transformed miraculously into a magnificent mallard skillfully downed at 80 yards.

Not all factoids go undetected. I once knew a man of unquestioned (to his face) integrity who swore that a huge trout had broken his fishing rod. We did not brand him a liar outright even though it was transparently obvious that not even a 60-foot blue whale could have broken the rod before it snapped the 4-pound test leader. Later that evening, a member of our group siddled up to me with a wicked look on his face.

"You want to know how that rod really got broken?" he asked. "I was watching from behind the trees and saw it all. Lardbutt over there sat on it."

Fortunately, such embarrassments are avoidable if you are moderately inventive, and approach the problem like any good poker player. In order to maximize your winnings on a bluff, you must first set the stage. It is wise to let your fellow card players call your bluff once or twice and find to their surprise that you really are holding four aces. Having paid dearly for their presumption, they will be more reluctant to question your holdings later on when you're one card shy of a full house.

Translated to angling terminology, it pays to occasionally tell the truth. Let's say you catch only three 8-inch trout all day, and you know you are being watched. Here is how you will want to relay this information later.

"Gee, I had a very poor day," you will state modestly. "I don't think I caught but one or two fish, and they weren't much bigger than sac fry." Note the careful use of understatement. Your foil may even help your cause by telling the others that you actually did better than you claimed. Having established your honesty, you can then fabricate the most outrageous lie imaginable the next time you fish with that bunch. Believe me, no one will question it.

A second important tip is to construct your factoid in such a way as to make it believable. For example, never claim that you caught a 10-pound bass. Embellish your report as follows:" I caught a 10-pound, 3-ounce bass." The addition of three ounces lends credibility to your statement, implying that you weighed your catch on certified scales.

There are, of course, several varieties of factoids. The "half-factoid" is merely an elaboration of a story that is at least partially true. The "full-factoid" is a total fabrication. For anglers with advanced skills, the "full, flying factoid" may be occasionally employed to construct not only false catches, but entire trips and companions. These usually begin thusly: "When I was fishing with the late Czar's grandson in Siberia last summer..."

As for Lardbutt's unfortunate incident with the broken rod, he missed a golden opportunity to enhance, rather than diminish, his reputation. Had he been a truly skilled practitioner, he would have known this was the perfect place for a half-factoid.

"You know," he could have said. "I actually broke my rod when I sat on it, but I think it snapped so easily because, about an hour earlier, I lost a giant trout that put a crack in it."

Thanks Norm, we needed that.

September, 1989
Volume 53, Number 9

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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DEPARTMENTS

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Cover *White-tailed deer enjoy the misty early morning under tall trees in the edge of a foothills meadow. Photograph by William S. Lea.*

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Each tree has *a two-way transport system. Water absorbed by roots moves up the trunk through tubes in the sapwood to the leaves where it is sprayed out in a fine mist, a process called* evapotranspiration. *Water is also combined in the leaves with air to make food for the tree. This food is carried down the tree through specialized tubes beneath the bark.*

Roots help *anchor trees in the ground and also take in water and minerals that enable the tree to grow. Some trees, such as this upland oak, grow roots that penetrate deeply, while other trees only send out surface roots. Regardless of whether the tree grows a tap root or not, most of its roots are within a few inches of the surface.*

The tree's main *roots, like its main branches, grow thicker each year. When they meet an object like a stone beneath the surface, they grow around it. Some of the thinner, feeder roots die in months.*

Some trees are *opportunistic, growing a tap root where the soil is dry or only surface roots where there is plenty of water. A tap root is not necessary for every tree.*

Surprising Roots

written by Lawrence S. Earley / illustrated by David Williams

Tree roots run everywhere below us like water pipes. Like pipes, roots also serve as transport lines, sucking water and minerals out of the earth and carrying them to the tree. Roots are also the tree's primary supports, lodging them firmly in the soil as they grow. Transport and support are their two main functions, but they also perform other useful services. They anchor the soil and, together with fallen leaves and other forest litter, reduce erosion. Roots also store food, and some trees (black locust, sassafras, and sweet gum) sprout from roots.

Despite their utility, few of us — including scientists — know much about roots. They're just too invisible to be appreciated, performing their work quietly until they finally get our attention by pushing up our sidewalks or growing into our drainage pipes.

Here are a few other surprising facts about tree roots:

1) **Most roots are just a few inches below the surface.** Most trees fall into two groups — those with deep-penetrating roots, and those without. Among the species traditionally considered as having a deep root system are oaks, hickories, walnuts and the longleaf pine (which develops a deep tap root in its early years). Elms, birches, hemlocks, and spruces are thought of as shallow-rooted.

Yet though heredity will often dictate whether a tree will grow deep roots or not, foresters note a lot of variability depending upon whether the soil environment is wet or dry. Red maples, for instance, are opportunistic, growing surface roots in a wet environment such as a swamp, and putting down deep roots in an upland situation. Other trees do the same thing. And whether it has a deep tap root or not, most of a tree's roots are just below the surface. "We're finding that 90 to 95 percent of the biomass of the root system is in the upper 6 inches of the soil," says Rich Braham, Assistant Professor of Forestry at N.C. State University. "That's where the rain is falling, where the oxygen is, where the nutrients are, and roots need to be right up there to capture all that."

2) **Roots grow up as well as down.** Like any earth-bound object, roots are bound by gravity and are pulled downward. But they will also grow toward water and since water is often most abundant in the leaf litter layer, the roots will grow up to reach it.

3) **Many roots are short-lived.** Roots come in a variety of sizes. Broad, thick roots anchor the tree in the ground. Growing out of these permanent roots are smaller roots that explore the soil for water and minerals, dying after a year or two. On the restless roots grow millions of feeder roots, sometimes covered with mycorrhizal fungi that actually do the job of absorbing water and minerals. They may die in months and will certainly die in winter when deciduous trees drop their leaves.

4) **Roots are the underground branches of the tree.** It's easy enough to look up at an oak tree and notice its branches soaring overhead. But few of us ever consider the subterranean portions of our trees. A general rule of thumb is that a tree's network of roots extends about as far as the tree is tall, says Dr. Braham. But growing by itself, with no competition, a tree's roots may push out twice or three times that distance. A big oak may have thousands of miles of roots below it.

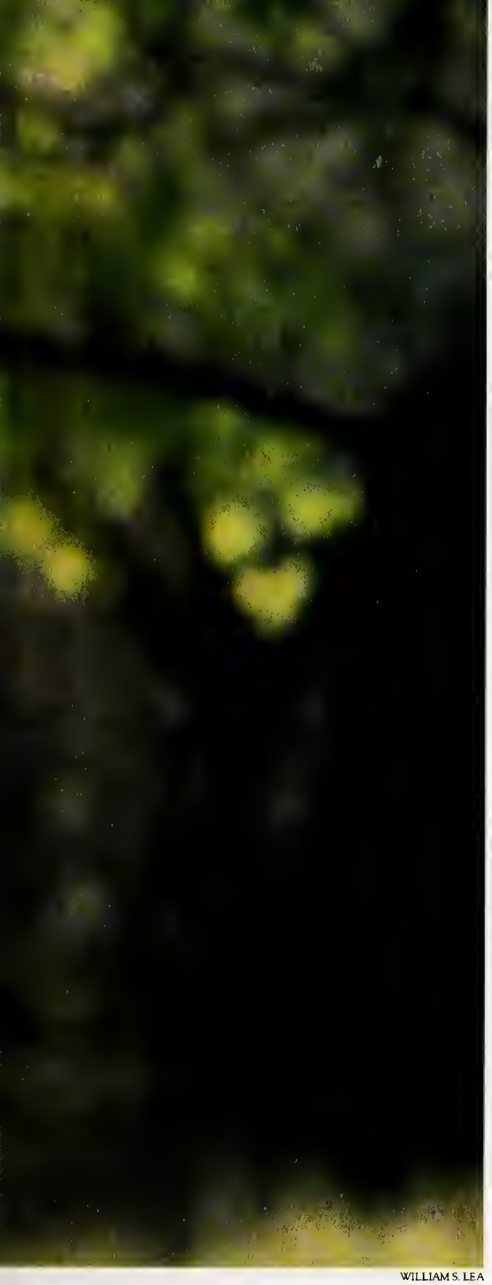
***The litter layer** consists of dead leaves and other organic debris. Aided by bacteria, fungi, and invertebrates, especially earthworms, these leaves decay and are broken down into the minerals which roots can reuse.*

***Some upland** trees like pines have feeder roots covered with fungi that actually do the job of absorbing water and minerals from the soil. Each tree may have hundreds and even thousands of miles of these roots.*

Bow & Arrow Whitetails

Is the ultimate Tar Heel hunting trophy a deer bagged the old-fashioned way? So say archery enthusiasts, and more of them are stalking their quarry with bow and arrows than at any time since the Indians chipped their points from stone.

by Eddie Nickens



WILLIAM S. LEA

Though the quarry is the same, deer hunting is especially challenging when the hunter picks up a bow. Other benefits include a longer season, fewer competitors and the right to take a doe at any time during the bow season.

The beam from Eddie Crabtree's flashlight gave away his gait. The light jabbed crazily in all directions, bobbing up and down the dirt track that connected one flat expanse of Gates County cornfield to another. Flickering from the trees to the track to the sky overhead, the pattern of light could mean only one thing. Eddie Crabtree was running.

We'd been back in camp for an hour or more, cleaned the camouflage paint from our faces, rubbed alcohol on insect bites and set aside our bows for the next morning's hunt. Eddie was late getting back to camp; we hoped that meant good news. The light came closer and closer, and suddenly disappeared. Eddie stepped into the ring of firelight and held up a single arrow stained with blood from broadhead to fletching. The gleam in his eyes gave away his words before he could speak: "Boys," he said, gasping for breath, "I got one!"

That was nearly 15 years ago, a period of time that has seen a virtual technological revolution for the sport of bowhunting. Today the recurve bow that Eddie Crabtree used is nearly as rare in the bowhunter's arsenal as are Damascus steel barrels on a dove shoot. The compound bow is the overwhelming weapon of choice in the field, and a list of archery accessories reads like an intergalactic warrior's armaments: laser sights that project a red dot up to 500 yards away, luminescent sighting pins, broadheads with blades that fold into the shaft and spring open on contact. But if the tools of the trade have changed dramatically since Eddie Crabtree huffed and puffed into camp, one thing surely hasn't: the excitement of bagging a deer with a bow.

The serious deer hunter has probably considered trying this ancient method of hunting more than a few times. It seems a natural progression for many long-time deer hunters. Successful with shotgun or rifle, many fervent gunners desire a way to increase the challenge of deer hunting. Nothing will do that better than switching to a bow.

But there are other reasons for turning to the bow and arrow. It's a fact that bowhunters enjoy less crowded fields and forests than do their gun-hunting brethren, and a quick glance at North Carolina hunting regulations will reveal that archery season runs for a longer period of time than nearly any other hunting season. Indeed, bowhunters in the state's eastern district barely have time to cook their opening day doves before the sun rises on the first morning of bow season. Consider also that bowhunters may take does at any time of the bow season and you have a package deal that should send even the most ardent gunner scurrying to the archery shop.

And that's where the budding archer soon will find himself waist-deep in a technological quagmire, though it doesn't have to be that way. The most important step in switching from gun to bow is to find a competent and knowledgeable archery dealer that you trust to lead you through the maze of bowhunting equipment. On your first year out, keep it simple: a bow, arrows, sight, quiver, armguard and finger-release mechanism will get you afield. Armed with the following basics of bowhunting technology, you may well get through the selection process for primary equipment without suffering a nervous breakdown. If so, you'll have no trouble remaining calm when a trophy finally strolls your way.

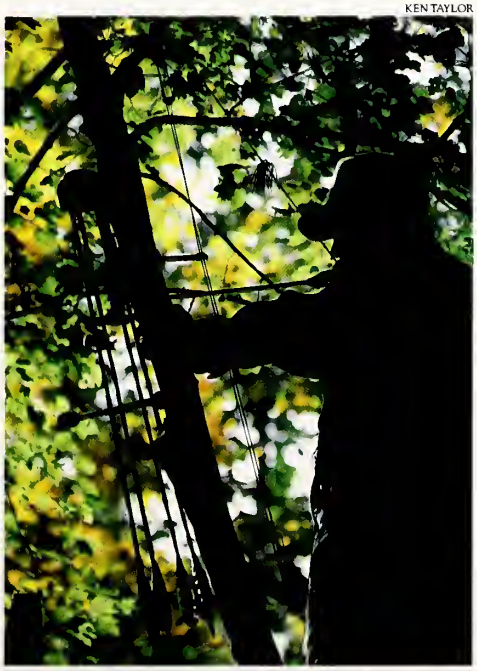
The Right Stuff

The first order of business is, of course, the bow. Perhaps no piece of sporting equipment has changed as radically as the modern hunting bow in the last 10 years. Without a doubt the compound bow offers the newcomer the best chances for success, but don't be lulled by talk of virtual mass factors and force-draw curves; leave that for the scientists. While compound bows look like the latest Pentagon fantasy, the theory they exploit is as simple as a pulley.

Compound bows rely on a series of wheels and cables that act as a pulley system when the archer draws the bow. The results: a "letoff" in the tension needed to hold the bow at full draw, higher arrow speed and a flatter trajectory. By far the greatest advantage is in letoff: a bow with a draw weight (the maximum force in pounds of a bow drawn to a specified draw length) of 65 pounds with a letoff of 60 percent means the archer is holding the loaded bow at only 39 pounds of weight. That means you can hold the bow at full draw more steadily and for a longer period of time. And that results in more accurate shooting.

Most archers climb a tree for their brand of deer hunting. Heavy early-autumn foliage reduces visibility for still hunting, so tree stands provide the edge for the hunter. Buy a secure safety harness that enables you to lean away from the tree.

KEN TAYLOR



Radical changes in bow design have revolutionized the sport of bow hunting. First-time buyers will be looking at an often mystifying array of compound bows designed around the pulley system. Arrows are constructed from a variety of materials ranging from aluminum to graphite.

KEN TAYLOR

Again, a relatively simple idea, but you wouldn't know it by reading the archery catalogs. Each manufacturer has its own special wheels and pulley system, loading them with names that would send Rambo into a buying frenzy. But basically there are three different types: wheels, cams and speed wheels, and a combination of the two. In general, wheels provide a greater degree of smoothness to the draw, while cams provide greater speed. Compromise is the name of the game in choosing between the two, but the beginning archer may want to opt for a bow that is more forgiving of stylistic errors than one as fast as a cat and twice as finicky.

A relatively new concept in string design may make the decision easier than ever. Whereas many archers in the quest for more arrow speed have recently gone to an "overdraw" system, which involves an oversized arrow rest that allows the shooter to use shorter and lighter arrows, a new string/cable design called "Fast Flight" is narrowing the technological gap. The shorter arrows used with overdraw systems are less forgiving of poor releases, so beginning archers should consider the "Fast Flight" system. Again, query your dealer.

With bow in hand, it's time to turn to the ammunition. Choosing the proper arrow is a function of six criteria: shaft material, length, weight, spine (the stiffness of the shaft), fletching and point. Gone are the days when all top-quality arrows were made from Port Oxford cedar. Most modern arrows are now fashioned from aluminum, but fiberglass, graphite and even carbon are making inroads in what used to be an alloys-only domain. Any good archery dealer will be able to provide you with the proper length, weight and spine for your bow, so your decision is primarily one of fletching and broadhead. In general, traditional feather fletching provides a greater forgiveness factor and more control, while the plastic vanes hold their speed more efficiently at ranges beyond 40 yards and are impervious to weather. Beginning bowhunters aren't likely to feel comfortable shooting at extreme ranges, so traditional feathers may be the better choice at first.

But the shaft only delivers the arrow; it's the broadhead that does the work. Unfortunately for the beginning bowhunter, there are so many broadhead designs on the market that choosing one is like playing pin the tail on the donkey blind-folded. Let a skilled hunter give you guidance and help you find a broadhead that shoots well from your bow. Then practice with it.

KEN TAYLOR

***The business-end** of an arrow—the broadhead—comes in a bewildering number of types. Expert guidance in choosing a shooting system is advised.*

To do that you'll need a good bowsight. Granted, the laser beam bowsight is overkill, but when you're finally called on to draw your bow on a deer, you don't want to be sighting with a skimpy design. Key components of a proper sight include sturdiness and a degree of luminescence to the pins, which is helpful in the low-light situations deer hunters often require. While some archers prefer four, five and six-pinned sights, others feel they'd rather have a less obstructed view of the target and go with the three-pinned sights.

There's no doubt you'll be mesmerized by the plethora of accessories that go far beyond the basic equipment mentioned here. But remember: You need to crawl before you can walk. A final word on equipment: Check it all out in hunting style before the season. Today's technical equipment requires a high degree of tuning, and even the slightest shift in equipment can cause your aim to go awry.

One hunting buddy of mine was proud of the marksmanship he'd honed at his backyard range. The night before opening day we sent arrow after arrow into the vitals area of a deer target, then I switched to broadheads to check my flight. I'd been practicing with blades periodically, tuning my sights to the different flight pattern of the real thing. When he loosed a broadhead-tipped shaft for the first time, the aerodynamically altered arrow burrowed into the dirt beneath the target. His carelessness resulted in a confidence-draining scramble to re-sight his bow by floodlight in the backyard.

Practice in the clothing you'll hunt in, and practice from a variety of positions: standing, kneeling, bending around trees. When you can put four arrows out of five into a dinner-plate sized area at hunting ranges, it's time to shinny up a tree.

The Right Style

Putting your newfound (and hard-won) archery skills to work in the field means altering your deer-hunting tactics to bowhunting's basic premise: you have to get far closer to a deer when hunting with a bow

KEN TAYLOR

***Equipped with a** a bow, good arrows, and a bowsight, the beginning archer is in business. After this initial investment, it's the old game of practice, patience, luck and skill.*

than with a gun. To do that, you need to be doubly aware of your quarry's defense mechanisms. Fine-tune all equipment before taking to the field: fix that squeaking tree stand, hang your hunting clothes outside to keep household odors away, and scout your hunting area for the best possible stand site. In the early bow season it's very difficult to still-hunt; the dry woods of September and October are noisy, and the heavy foliage keeps visibility shortened. Therefore, bowhunting is invariably stand hunting, so scout to find where deer are now—don't rely on their location last gun season when different foods were available and the rut altered behavior patterns. And don't use doe-in-heat scents when the rut is a full two months away.

Once you've located deer, place a stand with your weapon's limitations in mind. A tree stand directly above a well-used trail will afford the archer a much smaller vitals area than will one placed 15 yards to the side. Invest in a secure safety harness that will allow you to lean away from the tree to draw your bow; it takes more movement to loosen an arrow from a bow than to aim and fire a rifle, so you'll need to be very trusting of your tree stand and harness (see "Safety Up A Tree," p. 26). And why wait until opening morning to see what the world looks like from up there? Shoot a few arrows from your ambush site before the season opens and you won't have to wonder which sight pin to use when the real thing wanders by.

When that happens, you'll be faced with one of hunting's oldest challenges. If you've done your homework, you'll be rewarded with a successful shot.

And that's where the real work begins. Keep in mind that while a bullet kills by shock and tissue damage, an arrow is lethal largely by hemorrhaging. That means bowhunters must exhibit more patience after a hit than do gun hunters. When Eddie Crabtree loosed his arrow on the edge of that Gates County cornfield, the last warm glows of a September sunset were fading. When he inspected his arrow closely, he saw greenish matter in the fletching, proof positive of a paunch-shot deer. He knew better than to pursue the deer in the dark, so he waited till first light. Even when you've scored a hit in the vitals area, archers should wait an hour before tracking. For a shot in a non-vitals area, wait four to six hours. When we arrived at first light the next day, we tracked Eddie's deer less than a hundred yards to a privet-choked gully. Had he pushed the deer the night before, we might never had found it in the thick brush.

Hopefully, those are lessons you'll need to use, though few bowhunters score their first season out. But just remember what drove you to this game: a greater challenge. No one ever said it would be easy—and no one really wants it to be. ⊡

Sound-Side Sea Trout

Specks and grays are running again at traditional hotspots along the Outer Banks, but some anglers worry that the cycle might be short-lived.

written and photographed
by Joel Arrington

Pamlico Sound trout have been making the papers regularly over the last couple of years. Indeed, anglers fishing for both the speckled and gray species enjoyed something like boom times last fall in North Carolina, although great numbers of trophy-sized trout have yet to appear. Nevertheless, short-term prospects are excellent, and if anglers and commercial fishermen would exercise some restraint, many believe good trout fishing could be extended a long time into the future.

As speckled trout began to recover from catastrophic winter die-offs of the late 1970s, fishing began to improve all over coastal North Carolina, but especially during the fall months in northern Pamlico Sound near Hatteras and Oregon inlets. Anglers had always caught both speckled and gray trout in the channels inside Hatteras Inlet, but in 1984 that fishing began to improve. Primarily these are speckled trout, with only the occasional and usually larger gray trout mixed in. Guide Edgar Dickens says the fish were small the first year — just 1 to 2 pounds. Since then, speckled trout have run bigger, with most last fall weighing 2 to 3 pounds. Not a few citation-winners (4 pounds minimum weight for speckled trout, 6 pounds for gray trout) were weighed last year.

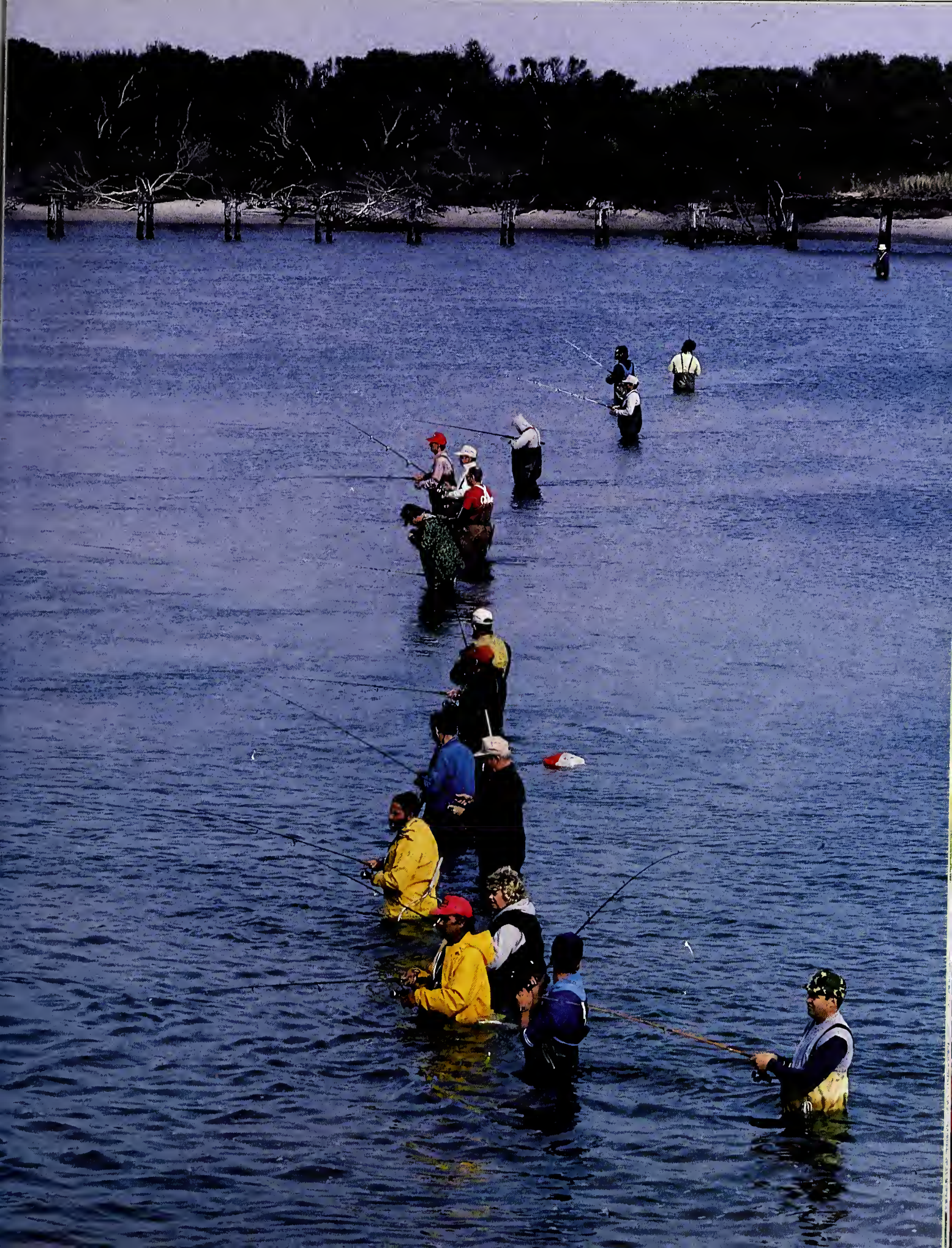
Trout fishermen intermittently enjoy fast action at Hatteras Inlet, where fishing is only from boats, and at Oregon Inlet where anglers may wade, fish from shore, from the bridge, or from boats. Action at both locations may begin in September and run to Christmas in good weather, depending on how cold the water gets. Fishing is usually off and on, and will not be exceptional until the water reaches about 65° F. Below 55°, trout fishing becomes unreliable, but a three-day or longer warm spell in December can start fish feeding again. November offers the most days with ideal water temperatures in this 10-degree range.

In the late 1970s, 10- to 12-pound gray trout were common at Oregon Inlet, but fishing for those trophy fish trailed off and has not returned. Even small fish were conspicuously absent early in this decade, but they have now returned in good numbers. Recent falls have yielded big catches of grays up to about 6 pounds.

Well-equipped bridge fishermen suspend lights (driven by a gasoline generator) over the catwalk to attract bait. Then they cast jigs with long plastic tails or fish a live bait for gray trout. Anglers also caught bluefish to 6 pounds that way last year until they migrated to deep water offshore.

A good public ramp at Oregon Inlet gives small craft access to trout fishing under the bridge and in the nearby "coast guard channel." Waders have found this location, however, and at times it has been mobbed and

***This speckled** trout fell to a plastic grub, a favorite lure of North Carolina sea trout fishermen. A school of wading anglers (right) probe the depths of a trout hotspot near Oregon Inlet. Sea trout congregate in depressions and channels or near underwater structure.*



A glittering prize, *this gray trout was caught near Hatteras Inlet. The channels near Hatteras and Oregon inlets are favorite spots for anglers when sea trout begin their "runs" into Pamlico Sound in the fall.*

parking facilities have been strained. Starting in late summer, small gray and speckled trout take plugs and grubs well. Early morning and late afternoon fishing are often best for these 1- to 2-pound fish, but mid-day catches are not unusual. As fall comes on, fishing improves with both more and bigger trout of both species.

A blitz of trout, flounder and puppy drum ran for several days in November last year, not only in the coast guard channel and under the bridge, but on the shoal west of Pea Island. Anglers waded several hundred yards into the sound.

The now famous location at Hatteras Inlet is called the "Dredge Island," which incorrectly implies fishing is narrowly localized to channels near a spoil island at marker No. 9. Boats do tend to congregate tightly nearby, but that is primarily because boats always tend to congregate. Anglers, here as everywhere, watch each other to see who is catching fish and move whenever they are not and someone else is. It causes crowding. Last year on weekends, I counted as many as 30 boats within an area the size of a football field.

Local experts and guides usually leave the knot of boats with tense anglers throwing lures near each other to explore the many square miles of channels elsewhere inside the inlet. To locate fish, Dickens drifts and asks his clients to cast, then anchors when they find fish. The bottom is rippling sand with few obstructions. Only a shallow depression or some other unseen bottom feature seems inexplicably to hold fish and you must cast to that spot to catch anything. When you hit the trout lode you can catch one on nearly every cast. At times in eastern Pamlico Sound it is as if you are anchored in a river of trout unseen below your boat. But this can change with the tide level or if the fish are disturbed too much. It accounts for wide variation in success among anglers. Those who by luck or skill get into the fish do well; those who don't, don't.

Knowledge of the intricate woven channels and shoals inside the inlet is by far the most important ingredient to success, even more than luck. Dickens says he can mentally divide the area into quadrants. One will have 4-pound trout, another mostly 2- to 3-pounders. Unfortunately, a blow will stand this organization on its ear and he will have to fish many hours to figure it out again.

On any given day, conditions may not stay the same five minutes. Short-term variables are tide, wind, depth, sunlight, and water temperature. Newcomers will be amazed at how quickly water temperature changes. Onshore winds carry warm water from offshore to the beach. Conversely, offshore winds cause upwelling of cold water and blow the warm water near the beach offshore. One tide change can bring new water and a radical temperature change inside the inlet and make the difference in good or bad trout fishing.

Lure variables include design and weight as well as how you retrieve. Grubs are the predominant lure and few anglers use bait of any kind. (When puppy drum are about, as they often are, many anglers tip a grub with shrimp.) Gang-hooked plugs tend to pick up too much eel grass. Savvy anglers vary grub weight according to depth and current. The deepest channels where trout are caught

***Speckled trout** (above) are generally caught much more often than gray trout by anglers. After substantial winter die-offs of trout in the late 1970s, fishing has improved in the mid- and late-1980s.*

here are about 12 feet, although most fish come from shallower water. Fishing is almost always better while the tide runs. Dickens says he caught trout on mirror plugs at slack tide in 1987, but that he couldn't do it last year. Some anglers I spoke to use hopping retrieves, others used a steadier retrieve. I vary mine, retrieving grubs more slowly in cold water. Nothing works all the time.

As the season wears on and water temperatures fall, trout tend to go to deeper channels. Some anglers like to bump bottom, others do not consider that important as long as they work the middle of the water column. Grub heads may weigh from ¼ to ¾ ounce, but Dickens says he never goes over ½ ounce. There are times when any color — any lure — will catch trout, but at times they seem to prefer only one size, shape and color of lure. Long green grub tails were popular, at least among anglers, for weeks last fall, but I fished other colors and sizes out of curiosity and to try to prove a point. Sometimes I caught fish on short white and fire-tail yellow grub tails just as well as my partner fishing the long green ones; another day I did not. Topwater lures are seldom fished, although I feel sure they would be at least moderately successful at times, especially early when the water is warm.

Plugging or grubbing for trout is where you can fish tackle as light as you like. Most regulars prefer 6- to 10-pound test line on ultra-light to light spin rods. When the puppy drum appear and run to 10 or 12 pounds, as they occasionally do, you may be glad you brought a rig with 12-pound test line. Most anglers bring at least two rod-reel combinations. To relieve fatigue (and just for variety), I usually have both plug and spin.

A landing net is important because trout have thin, membranous mouths from which hooks tear out easily. Even veterans, however, will lift small fish into the boat without a net, though they occasionally lose one.

Small skiffs are safe here once you get past the ferries' wakes. Teach's Lair Island Yacht Club has a good ramp and rents boats with outboard motors, and there are other ramps in Hatteras Village. A few local experts, including Dickens, have begun to take paying guests. Guide service, more than anything, will increase your chances for success, but even experts fail to find fish some days.

Some anglers have expressed concern over the numbers of fish being taken from eastern Pamlico Sound on hook and line. It is not known whether the magnitude of harvest we have seen lately damages trout populations, but that is, according to some of the complainers, beside the point. With some regulars catching 100 or more trout a day for days on end, these concerned anglers argue for a more even distribution of the fish.

A size and creel limit may help. Every state from Maryland to Florida, except North Carolina, has adopted an Atlantic States Marine Fisheries Commission management plan which provides for a 12-inch minimum size limit on speckled trout. North Carolina will consider it this year (1989). Some critics say that a minimum-size limit will not be enough and argue for a creel limit of, say, 20 fish. Similar laws are in effect in several Gulf Coast states and in South Carolina.

So far, however, speckled trout in North Carolina have held up well to vastly increased fishing pressure, succumbing periodically to the cataclysmic effects of cold weather. Scientists like John Merriner of the National Marine Fisheries Service in Beaufort say fishing has had little long-term effect on speckled trout. "Variations in abundance of spotted sea trout have been more correlated with winter kills than with fishing pressure," he said.

Even before we began to poison the water and over-harvest many fish species, populations varied widely over time. Fish are unquestionably subject to influences of which we know little or nothing. Anglers and managers often must guess what may have caused booms and sharp stock declines, but even when they guess correctly the knowledge probably will not help maintain steady populations. Success in damping population swings has almost completely eluded fishery scientists.

Environmental factors like cold weather and such complex and intractable problems as acid rain are often the over-arching consideration. Sometimes we suspect natural forces, like sun spots and the level of ultraviolet light on egg viability, but do not have the data to prove it.

Always, however, little problems like excessive fishing complicate big ones. A frequent argument thrown against any regulation set up to limit harvest is that something other than too much fishing caused the population decline and when that clears itself up the fish will reappear as abundant as before. This argument is heard at nearly every public hearing by opponents of regulation. But the purpose of regulations is to allocate as well as to conserve. Creel and size limits, season length, gear restrictions — all seek as much to equitably distribute remaining stock among those who use them as to protect dwindling populations.

For the time being, however, no regulations stand in the way of anglers catching and keeping all the sea trout they can catch in North Carolina. Only a personal sense of what is appropriate and prudent guides us and protects what has recently been, so far, an expanding resource. The question is whether that is enough. ⊠

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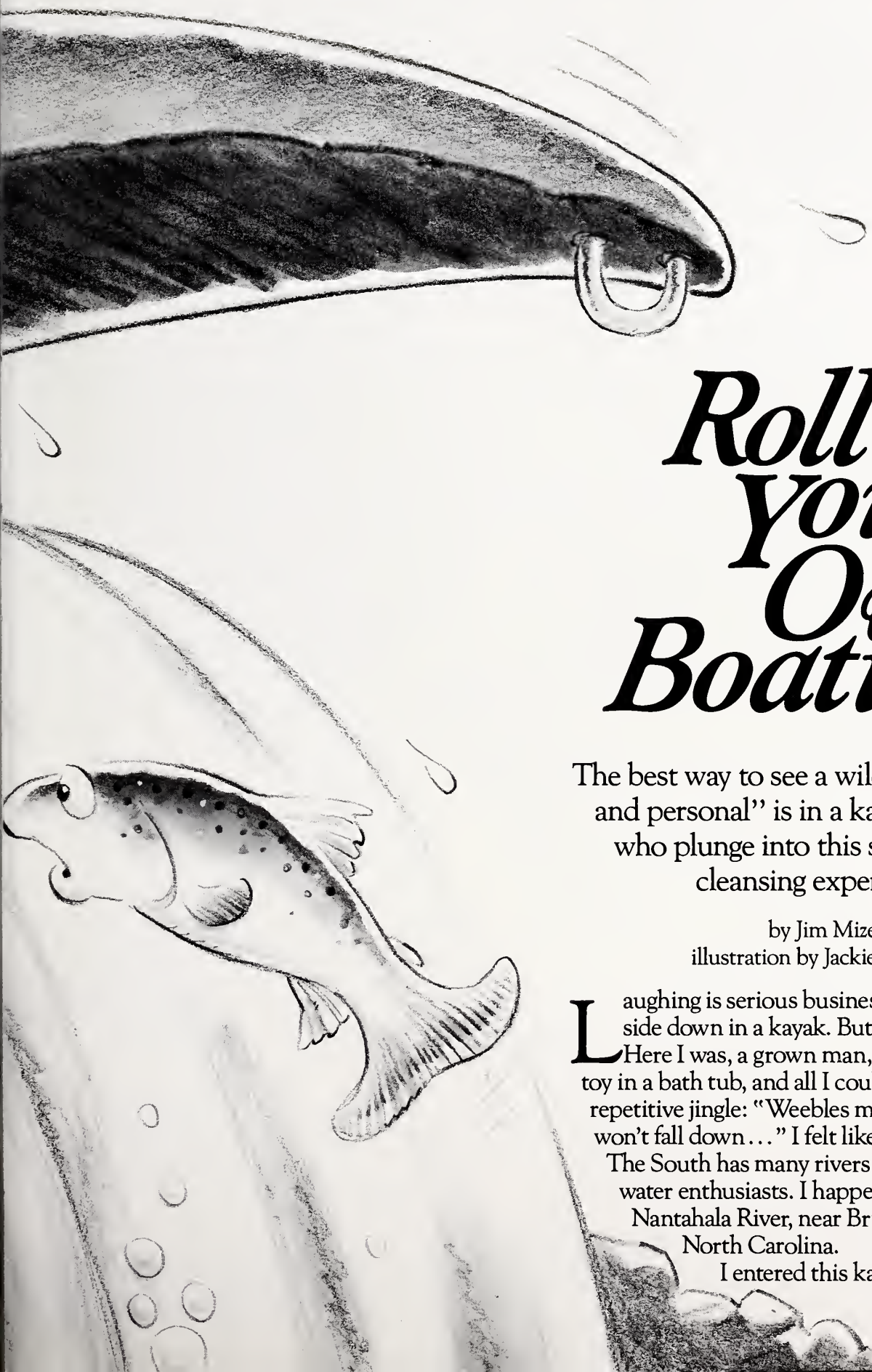


Roll Your Own Boating

The best way to see a wild river "up close and personal" is in a kayak, and those who plunge into this sport find it a cleansing experience.

by Jim Mize
illustration by Jackie Pittman

Laughing is serious business when you're upside down in a kayak. But I couldn't help it. Here I was, a grown man, flipped like a child's toy in a bath tub, and all I could think of was a repetitive jingle: "Weebles might wobble but they won't fall down . . ." I felt like a flipped weeble.

The South has many rivers that attract white-water enthusiasts. I happened to be on the Nantahala River, near Bryson City, in western North Carolina.

I entered this kayaking class at the

Nantahala Outdoor Center because I was totally ignorant of the sport. I always pictured kayakers as different, you know, the kind of people who eat yogurt, wild hickory nuts, and possum soup. To show you how wrong I was, my group included a doctor and a lawyer. And neither liked yogurt.

Was I ever reassured to be in the company of a doctor *and* a lawyer. Just think, if I had an accident, not only could I get immediate medical attention, but if something really went wrong, I could instantly sue for malpractice.

By anyone's measuring stick, I was a novice. Kayak sounded to me like a Chinese word for "Gesundheit." For the first 30 minutes of our class, every time the instructor said "kayak," I added, "Bless you." The other students thought I was a priest.

And the sport appeared so simple. You can't misspell kayak, since forwards or backwards it's the same. The boat takes after the word with little difference on either end and the paddle has two blades so you don't even have to know which end to put in the water.

If Perry Mason ever tries to prove kayaking is foolproof, I'll get a summons.

Should any of you consider taking up kayaking, let me offer a few insights and suggestions gleaned from my first two days under water.

First, there is no hole in the bottom of a kayak. From a distance, kayakers appear to be wearing the boat like a water float, using their feet to walk on the bottom. This may not be such a bad idea, but today's kayaks have yet to incorporate such a convenience.

Second, the beginning kayaker must learn two classes of maneuvers: those you perform right side up and those you perform upside down. Of the two, the latter tend to be more important, so let's start there.

Of the upside-down moves, the best to know is the Eskimo roll. This is not an Alaskan breakfast food, but a maneuver designed to put a kayaker right-side up before the Piece of the Rock Group begins negotiations with his next of kin. No doubt my flailings not only could have kept a whole tribe of Eskimos rolling, but brought hysteria to their sled dogs as well.

My standards and the instructor's were not the same on this maneuver. He said you could tell a good kayaker by how well he can Eskimo roll. I argued the true measure of skill was in how well he avoids one.

The second upside-down move of importance is how to bail out. Despite my prowess at this maneuver, someone kept putting me back in and before long I was learning right-side up moves.

Among these are paddle strokes, buddy maneuvers to help right unsuccessful Eskimos, and ferries. When my friends had told me earlier I would cross streams using ferries, I had envisioned a larger boat to load my kayak onto. Unfortunately, the ferry is a crossing maneuver that gives the novice one more chance to talk to fish.

Portage is another term I picked up. It is a French word for walking where even fools fear to tread water.

Kayak equipment and boats are a lesson in themselves. I was put in a Jeti, said to be a forgiving craft. I suspect I was forgiven, but not forgotten. Before it was over, the boat had been dropped, submerged, and run into rocks, logs, sandbars, and very nearly a concrete bridge piling.

Bridges look much different from a kayak. Never before did I realize they have teeth.

The beginning kayaker must learn two classes of maneuvers: those you perform right side up and those you perform upside down. Of the two, the latter tend to be more important.

Also, kayaks come in one- and two-person models. I rate two-hole kayaks the same as two-hole outhouses: in principle they sound fine, but I'm not sure it's a place I would want to be with another person.

I never did learn, however, why kayaks are pointed. Was it to skewer rubber rafts or to stick in a mud bank, in the event a novice hits head-on?

And then there's all the gear. The kayaker wears enough gear to make even the beginner suspicious. First, there's the helmet. If good things were about to happen, why would you need a helmet? Second, everyone wears a life vest. Again, just one more reminder to check your insurance policy. Third, most kayakers wear wet suits. Notice a trend here? Finally, no one leaves the bank without a splash skirt to keep the boat from immediately filling with water should it tip. Or should I say, when it tips. If this group of paraphernalia doesn't clue you in on upcoming events, then you are a used-car salesman's dream.

Looking back on my two days under water, several memories stand out. Best of all, I remember how completely kayaking clears the cobwebs from the brain. Each dog-leg in the river requires a different approach, a unique paddle stroke, and total concentration.

One rapid in particular sums up the experience. It wasn't steep enough to be classified a waterfall, more like a kayak disposal. At the top, all I could see were waves, no rocks, no logs, no turns. I figured I could find my way from on top of the waves.

Then, I eased into the current and took off. The kayak didn't bounce over the water so much as it sliced it. The boat had little drag until the waves hit me squarely in the chest. Water splashed over my head and I found myself stretching and blinking away water to see over the waves, stroking hard on the paddle to build speed. Again, splash, stretch, stroke. And again, harder. Then with a final burst, I popped out of the spray into the near silence of a pool.

And then I slumped forward and rested, knowing that nothing else had mattered or entered my mind for the last 30 seconds, not work, not bills, nothing.

Not only does this sport take you away from it all, it imposes a penalty — dunking — if your mind tries to drift back to the office.

After day one on the water, we sat around a television watching a video on kayaking basics. So completely absorbed were we by the action that no one had his mind on work until one of the actors commented, "Out here on the water, you forget your responsibilities, your job, your bills." To which the doctor in the group replied, "You know, until he reminded me, I had." Likewise, so had the rest of us. And we spent the next few minutes looking for the way back to our earlier thoughts.

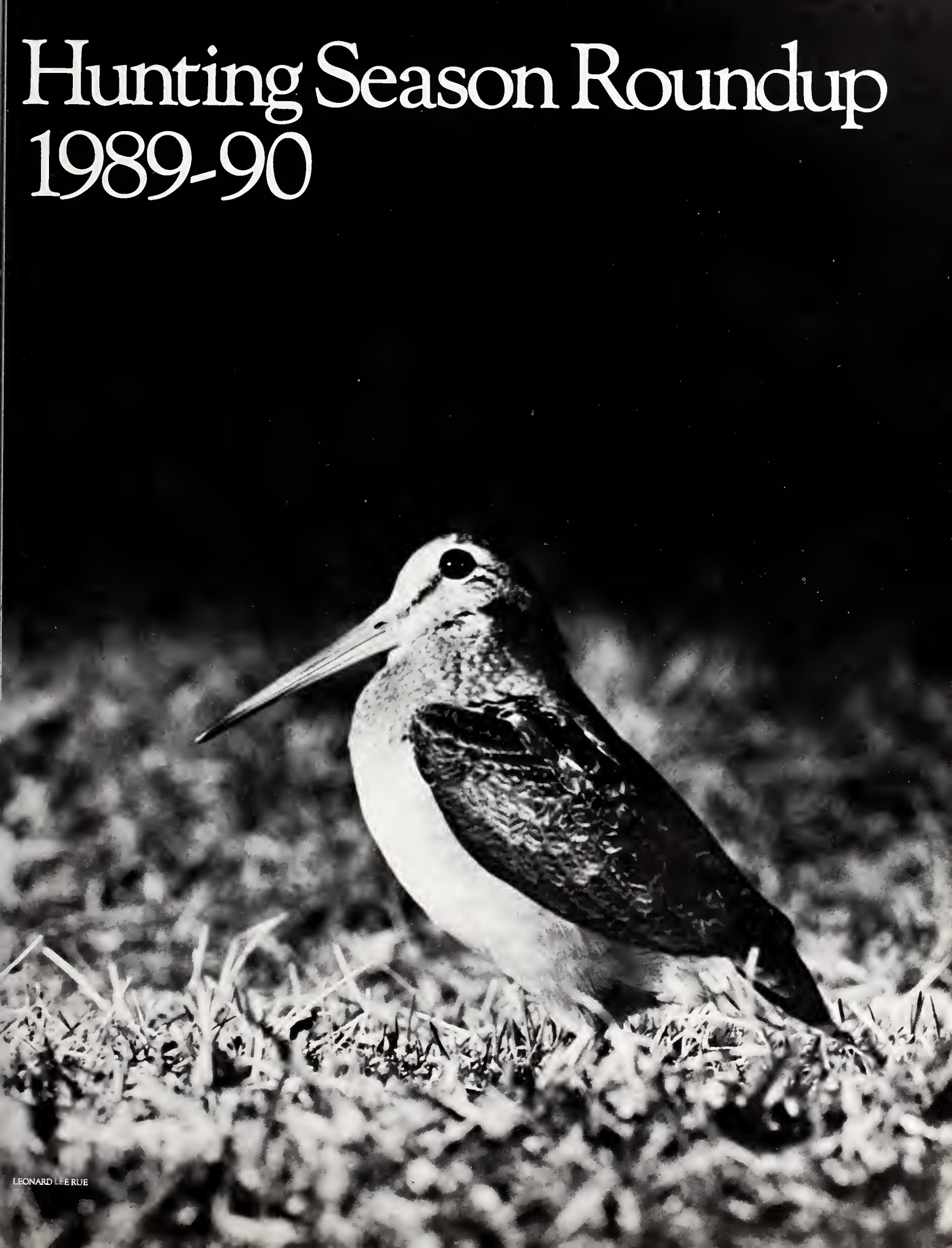
The Monday morning after my weekend on the water, I awoke stiff, remembering immediately where I had been the two days before. And I felt like a kid who had fallen asleep during his own birthday party, only to wake and find his friends and the decorations gone.

I resented being back here with responsibilities, a job, and bills. My only consolation was that the world that had held me so completely was on a river just a short drive away. That, and the fact that I was dry for the first time in two days.

The Nantahala Outdoor Center was founded in 1972 and offers a wide variety of outdoor adventures. For information on kayaking classes and other offerings, contact:

Nantahala Outdoor Center
U.S. 19W
Box 41
Bryson City, NC 28713
(704) 488-2175

Hunting Season Roundup 1989-90



LEONARD LEE RUE

North Carolina Hunting Seasons 1989-90

Species	Hunting Season	Daily Limit	Possession	Season
Crow	Thurs., Fri., Sat. of each week from July 1 to Feb. 28 and from June 1 to June 30 plus Labor Day and Christmas Day	No restriction		
Dove	Sept. 2-Oct. 7 (all day) Nov. 21-Nov. 25 (all day) Dec. 16-Jan. 13 (all day) Shooting hours are from one-half hour before sunrise until sunset.	12	24	None
Rails, Moorhens and Gallinules				
Moorhens and Gallinules	Sept. 2-Nov. 10	15	30	None
Clapper Rail, King Rail	Sept. 2-Nov. 10	15	30	None
Sora Rail, Virginia Rail	Sept. 2-Nov. 10	25	25	None
Deer		2	2	***4
Bow and Arrow	Sept. 11-Oct. 7 (*Eastern) Sept. 11-Oct. 7 and Oct. 16-Nov. 18 (*Western, except Yancey County) Sept. 11-Nov. 4 (*Central) Sept. 11-Nov. 11 (Northwestern)			
Muzzleloading	Oct. 9-Oct. 14 (*Eastern) Oct. 10-Oct. 15 (Western) Nov. 6-Nov. 11 (*Central) Nov. 13-Nov. 18 (Northwestern)			
Gun	Oct. 16-Jan. 1 (*Eastern) Nov. 13-Jan. 1 (*Central) Nov. 20-Dec. 2 (*Northwestern) Nov. 20-Dec. 9 (*Western)			

Gun Either Sex and Special Either Sex	See 1989-90 North Carolina Inland Fishing, Hunting and Trapping *Regulations Digest*			
Black Bear	See *Regulations Digest.*	1	1	1
Wild Boar	Oct. 16-Nov. 18 and Dec. 11-Jan. 1	1	1	2
Gray Squirrel	Oct. 16-Jan. 31	****8	16	75
Fox Squirrel	Oct. 16-Dec. 30 (Only in 18 counties. Season closed elsewhere. See *Regulations Digest*)	****1	2	10
Common Snipe	Nov. 14-Feb. 28	8	16	None
Quail	Nov. 18-Feb. 28	10	20	None
Ruffed Grouse	Oct. 16-Feb. 28	3	6	30
Raccoon and Opossum	**Oct. 16 (sunrise)-Jan. 31 **Oct. 23 (sunrise)-Feb. 28	No restriction on opossum. See *Regulations Digest* for bag limits on raccoon.		
Rabbit	Nov. 18-Feb. 28	5	10	75
Rabbit — Box Trapping	Nov. 18-Feb. 28			
Pheasant - Nonnative Male Pheasant Only	Nov. 18-Feb. 1	3	6	30
Woodcock	Nov. 18-Jan. 1	3	6	None
Bobcat	**Dec. 11-Jan. 31 **Dec. 11-Feb. 10	No restriction		
Fox	See *Regulations Digest*			
Groundhog	No closed season or bag limits.			
Wild Turkey Bearded Turkey Only	**April 14-May 12	1	2	2
Migratory Waterfowl	Unavailable at this time; Federal regulations may be obtained by contacting license agent or writing N.C. Wildlife Resources Commission after October 1, 1989.			

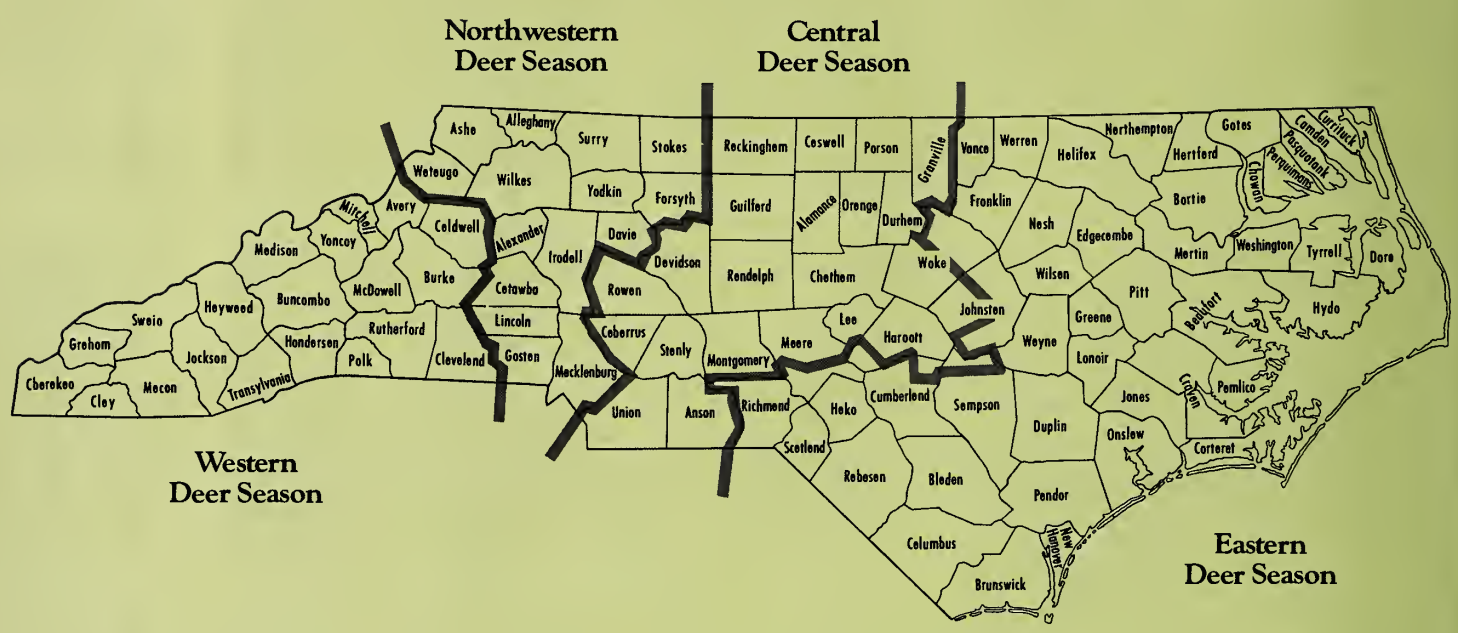
*See map on last page of this pull-out section for approximate boundaries of Eastern, Central, Northwestern and Western deer seasons; see *1989-90 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* for complete details. For a copy of the *Digest*, write: N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, N.C. 27611.

**Season varies from location to location; see *1989-90 Regulations Digest*.

***An additional antlerless deer may be taken during established either-sex seasons in Eastern and Central areas.

****Total limit of 8 squirrels per day of which one can be a fox squirrel.

Boundaries for North Carolina Deer Seasons



North Carolinians are blessed with good hunting. Deer, black bear, wild boar and wild turkey are all found here, and are considered big game. There is also excellent hunting for squirrel, rabbit, quail, dove and grouse.

Licenses. The first thing any hunter needs is a license, and the best buy for the all-around outdoorsman is the sportsman's license. This license includes all appropriate permits for hunting big and small game and fishing. For those who hunt only small game, a statewide hunting license may suffice. However, permits for big game hunting and primitive weapons must be bought separately.

Perhaps the best option for the serious outdoorsman is to buy a lifetime license. Five of these lifetime licenses are available — including the sportsman's license for adults, youths and infants, and lifetime hunting and fishing licenses. The sale of these licenses supports the Wildlife Endowment Fund, with only the annual interest being used for wildlife conservation. Eventually, the fund will play a major role in supporting wildlife conservation in North Carolina. Licenses are available from license agents across the state, and information on lifetime licenses is available from license agents, Wildlife Commission employees, or by writing the N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Game Lands. Finding a place to hunt is generally no problem. North Carolina has over 2 million acres of public hunting areas enrolled in its game-lands system. For the price of a game-lands use permit (which is included in the sportsman's license), sportsmen can hunt or fish on these public lands. Game lands are located throughout the state, and information is available free by writing: Game Lands Maps, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Tagging Big Game. Big-game hunters should also be sure to tag and report all kills. Big game — which includes deer, black bear, wild turkey, and wild boar — must immediately be visibly tagged at the scene of the kill. These tags are provided when hunters purchase big-game permits or sportsman's licenses. Then, the hunter must report the kill to a nearby wildlife cooperator agent. There are over 1,500 wildlife cooperator agents located throughout the state — look for their diamond-shaped signs at country stores, sporting goods stores and other businesses. The cooperator agent will fill out a big-game kill report. A duplicate of this card is given to the hunter, and serves as a permit to possess the animal. Later, information from the big-game kill reports is used to determine harvests and other trends. Copies of the annual big-game harvest reports are available by writing to the Division of Wildlife Management, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Hotline. Wildlife belongs to everyone, and if you observe people breaking wildlife regulations in the field, call the Wildlife Commission's toll-free Wildlife Watch Hotline at 1-800-662-7137.

U.S. FISH AND WILDLIFE SERVICE

RETURN OF THE REDWOLF

For the first time in many years, red wolves are again part of North Carolina's wild heritage as a result of a restoration project by the U.S. Fish & Wildlife Service at the Alligator River National Wildlife Refuge.

by Vic Venters

By the time the latch on the cage opened with a dull metallic clink, the two adult red wolves had darted to the back half of their enclosure. A bewildered pup stole a frightened glance at our intruding party, then vanished into the wooden box that had been its home since its birth six weeks before. Mike Phillips, biologist for the U.S. Fish and Wildlife Service's red wolf restoration project at the Alligator River National Wildlife Refuge, led his team into the wolves' enclosure pen and began examining the four pups.

Anxiety was reflected in the mother wolf's eyes—they told us we were unwanted visitors. With their bushy tails slung low, the

Back at last, *the red wolf's presence in the Alligator River refuge marks the first time wolves have been part of the state's wildlife heritage since the 1930s.*

RETURN OF THE REDWOLF

two nervously pacing adults hardly appeared the fearsome creatures of myth and legend. As the biologists vaccinated the pups, the adults never even hinted at a threatening move. "They're absolutely terrified of humans," Phillips said. "We don't like to come in here, but the pups need this treatment." We exited quickly, leaving the wolves a little shaken, but none the worse for wear.

It's only recently that the wolf has been regarded as anything more than a "varmint" to be eradicated. Increasingly, people are realizing the wolf's legitimate role in a natural ecosystem, and you don't need to go any farther than the Alligator River National Wildlife Refuge in Dare County to see that this is true.

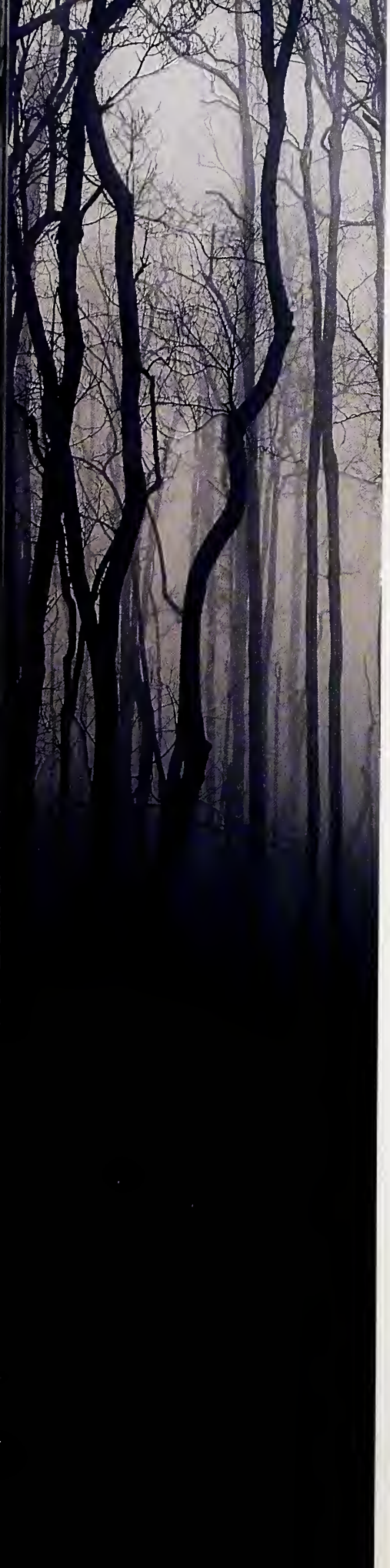
The red wolf returned to the Alligator River refuge in 1986, their reappearance ending a 50-year absence of wolves from the state. *Canis rufus* was originally native to North Carolina and was once common throughout the forests and bottomlands of the Southeast. Weighing between 40 and 80 pounds, the red wolf is smaller than the gray (or timber) wolf (*Canis lupus*), but larger than the coyote. With coloration ranging from cinnamon red to charcoal gray, the red wolf is lanky and long-limbed, an adaptation biologists believe helped *Canis rufus* hunt in the river swamps and wet coastal prairies of the South.

Although cattle and big-game predation were mostly associated with *Canis lupus*, the red wolf didn't escape human persecution. Widespread destruction of its bottomland hardwoods habitat, coupled with state and federal predator-control programs, decimated red wolf populations. By the 1960s, the red wolf had retreated to a five-county area of marsh and bog on the Louisiana and Texas border. In the 1960s, biologists found this small remnant population to be disease stricken and so short of suitable mates that the wolves were interbreeding with coyotes.

To preserve the genetic purity of the red wolf and save it from extinction, the Fish

***The remoteness** of the Alligator River National Wildlife Refuge in Dare County makes it an ideal site for red wolf relocation. Comprising over 120,000 acres of uninhabited land, the refuge supports an abundant prey base for red wolves.*

U.S. FISH AND WILDLIFE SERVICE



U.S. FISH AND WILDLIFE SERVICE

***Mike Phillips** of the U.S. Fish and Wildlife Service readies a red wolf for release. This animal is one of the two red wolves born in the wild on the refuge. The wolves are fitted with radio tracking collars that allow biologists to keep track of the shy creatures.*

and Wildlife Service began rounding up the surviving animals from the wild in the mid and late 1970s. While over 400 canids were captured, only 17 were determined to be pure-bred red wolves. With the species then extinct in the wild, a captive-breeding project was set up at Point Defiance Zoo in Tacoma, Washington. The effort has been a success, but the red wolf remains one of the most endangered carnivores in the world, with its population hovering at about 100 animals. In 1978, experimental relocations were begun at Bulls Island at Cape Romain National Wildlife Refuge in South Carolina. That experiment proved reintroduction was possible, but Bulls Island and similar coastal islands proved to be too small to support full-time reproducing wolf populations.

In the early 1980s, the search for a site shifted to the mainland, with selected coastal islands continuing to be used as breeding and acclimation stations. Initially, the Fish and Wildlife Service proposed reintroduction in the Land Between the Lakes region of Tennessee and Kentucky. Unfortunately, the wolf's distorted image preceded it. Public and governmental antipathy prevented the release, and in 1984 the project was killed.

About this time, the Prudential Insurance Company — through the efforts of the North Carolina Nature Conservancy — donated a 120,000-acre parcel of coastal marsh, forest and pocosin in Dare County to the Fish and Wildlife Service for the creation of the Alligator River National Wildlife Refuge. This huge chunk of land, relatively free from disturbance, had abundant small-game populations, and only two paved roads with a small neighboring population of 1,500 people. The new refuge presented an ideal red wolf restoration site. But would humans allow it?

Early in its efforts to locate the red wolf in the state, the Fish and Wildlife Service decided that if wolves were placed in the refuge, they would have to survive within the context of existing human use of the area. This meant that the traditional and popular uses of the local land such as hunting, trapping and agriculture would not be compromised by the presence of wolves on the refuge. The Service recognized that gaining the support of Dare County residents was

RETURN OF THE REDWOLF

U.S. FISH AND WILDLIFE SERVICE

***With the capture** of the remaining remanant population of red wolves in Texas in the late 1970s, the red wolf has been extinct in the wild. Relocation efforts at the Alligator River refuge began in 1987. Because of their endangered status, the red wolves on the refuge are amoung the most intensively managed carnivores in the world. Only rivers (below), logging roads and an occasional farm cut through the refuge's wilderness setting of forests and bogs.*

KEN TAYLOR

critical for the success of the restoration project. "The degree to which the red wolf can exist in the presence of man is almost entirely dependent on the attitude of the human population within and adjacent to the selected study area," stated Warren Parker, the red wolf project team leader in his re-establishment proposal.

In 1986, the Fish and Wildlife Service met with conservation groups, state government agencies, local politicians and concerned citizens. Four public meetings were held to explain the project and to quell some of the misconceptions about the red wolf. Since area residents raised relatively little livestock and the wolves posed no danger to the human community, public opposition was minimal. As part of its commitment to local hunters and trappers, the Service continues to this day to allow those activities on the refuge, including the running of dogs for deer.

With the project approved, four pairs of red wolves arrived at Alligator River refuge in November 1986 to be acclimated in holding pens. The wolves were gradually weaned from a dry dog-food diet to road-killed animals and finally to captured live prey. In September 1987, a pair of wolves was released, followed weeks later by the three other pairs.

Initially, the wolves were to be fitted with remote-controlled tranquilizer collars that would allow biologists to track and capture the wolves at will. However, the equipment failed repeatedly and the wolves were outfitted with traditional radio-tracking collars instead. These have allowed the wolves to be tracked on foot, or by boat, car and airplane.

Although the wolves were fed supplemental meals for a time after their release, they were able to capture food on their own after several months. Scat analysis shows that the wolves eat raccoons, rodents, frogs and turtles. Marsh rabbits are a favorite meal. They will tackle a white-tailed deer on occasion, although the smaller red wolf is not as efficient a predator against healthy adult deer as are the larger gray wolves.

As the reintroduction has proved, life in the wild is not easy for a predator, especially for one raised in a pen. Of the 12 wolves released by biologists on the refuge, six of them had died by last spring. Two fell victim to passing cars, one choked to death on a raccoon kidney, two females died of diseases, while one had to be put to sleep because of injuries received in a fight with another wolf.

In fact, the deaths of wolves were expected by the biologists. "We weren't surprised by the number of mortalities and we don't feel the deaths indicate that the program is a failure," Phillips explained. "We believe it is a measure of the program's success that all the deaths were natural or accidental and not the result of a citizen acting irresponsibly or on some unfounded hatred of the wolf."

The project's success will not be measured by the mortality rate, rather by the breeding success of the wolves in the wild. By this yardstick, the Fish and Wildlife Service can be happy; two pairs have mated in the wild and one pup has survived from each litter (See "Born In The Wild," p. 24). This summer, another 12 pups and adults were released. "The whole emphasis for this summer is to get enough animals out so that in the next breeding season in February 1990, we'll have a good chance of animals pairing up and mating in the wild," Phillips said. "If the mating in the wild does not go well this year, we'll have a pair or two of animals breeding in the pens as a back up."

Phillips said the cooperation of local sportsmen has been especially critical in allowing a population to become established. "Before the program, I had fully expected wolves to be poached," Phillips said, adding that deer hunters have had red wolves in their sights on at least seven different occasions but none were shot. Wolves have also been caught in traplines set for furbearing animals. On each occasion, trappers called the biologists and the wolves were released unharmed.

The Fish and Wildlife Service has gone to great lengths to retain cooperation from Dare County's populace. "We try to deal with people around the refuge as personally as possible, and be dependable about what we say we are going to do," Phillips said. "Initially, some of the hunters and trappers were concerned that the project would likely prohibit the use of deer hounds or trapping. But, as they found out, the wolf did not dictate policy and they can still run hounds or trap."

Retaining cooperation has also meant keeping the wolves out of areas used by people. By mid-summer, biologists had been able to locate the animals over 2,000 times by radio tracking — "almost at will," Phillips said.

Recapture has sometimes been necessary as the wolves often travel on roads rather than through the thick brush of the refuge. This habit makes travel easier for the wolves, but puts them at risk from passing cars, as the previously mentioned deaths testify. On two occasions, wolves have had to be removed from Manns Harbor, a small fishing community, where certain wolves had inadvertently wandered.

With adequate funding and support from Dare County's populace, Fish and Wildlife Service biologists are confident that red wolves will soon establish a self-reproducing population in the refuge. But the red wolf may face a potential threat from a "natural" source — the coyote.

Unlike either the red or gray wolf, the coyote has been able to thrive in the face of mankind's best efforts to eliminate it. In the past, wolves were a natural restraint on the coyote's range but since the larger canid's demise in most of the lower 48 states, the coyote has slowly spread its range east and south. Normally, wolves and coyotes do not interbreed but may do so when they are unable to find mates.

Coyotes have been found in North Carolina, and biologists with the N.C. Wildlife Resources Commission found evidence this spring that coyotes are also reproducing in limited areas in the eastern part of the state. However, biologists feel it may be five to 10 years before coyotes become established in the refuge area and by that time the red wolves will hopefully have a large enough population base to resist breeding with the coyote. "I suspect that if a population is doing reasonably well, the red wolves will displace coyotes," Phillips said.

Despite some problems — both potential and real — Phillips is optimistic. If the project is successful, the Alligator River refuge will be but one of three ranges where the red wolf will again roam in the wild. The Fish and Wildlife Service hopes to make the refuge a major captive breeding facility in the Southeast. While the refuge can only support about 25 wolves, the agency's long-range restoration plan calls for about 300 red wolves to be held in captivity with 200 in the wild in various reintroduction sites across the country.

This plan may take a long time to realize, but Phillips sees this restoration project as something larger and more important than just the salvation of a single species. "The mechanics of this restoration clearly previews the future of wildlife biology," Phillips explained. "The red wolf project is helping pave the way for the restoration of other endangered species. The same factors that were affecting the red wolf in the 1950s and '60s are affecting other organisms right now, and what we are doing with the red wolf in Alligator River will probably have to be done with great apes, Javan rhinos and Asian tigers elsewhere in the world."

Man's battle against wolves in the New World probably began near the North Carolina coast when Sir Walter Raleigh's expedition first clambered ashore near Manteo in 1584. Four hundred years later, the circle has finally turned, and there is hope that the war will end here too. ⊠

BORN IN THE WILD

When the first two red wolves were born free in Dare County's Alligator River National Wildlife Refuge last year, federal biologists found they had a lot to learn about parenting, tracking and collaring a pair of elusive pups.

by Michael Phillips

KEN TAYLOR

***The helping** hands of U.S. Fish and Wildlife Service biologists check a red wolf pup for parasites.*

During the spring of 1988, two pairs of free-ranging red wolves produced litters in the Alligator River National Wildlife Refuge. These pups were the first red wolves to be born outside a zoo in years (in 1980 the species was determined to be extinct in the wild). Since the adults — released to the wild just seven months earlier — were able to breed and produce litters, the conclusion was that red wolves could make the transition from life in captivity to life in the wild. During the months that followed, an exciting chapter in conservation was written as the pups matured and learned to overcome adversity. It all started on the morning of April 25.

Around sunrise, adult females 205 and 196 (each wolf is numbered) were observed from an airplane rented for observation purposes. Both looked heavy and walked in an uncomfortable plodding manner. Quite simply, they appeared very pregnant. Two days later 205 left a favored hunting area and moved back to the site where she had been released eight months earlier. Here she established a den. Within days we noticed that her mate was routinely making trips to and from the den. We felt certain that he was bringing food to 205.

In the western portion of the refuge, 196 was also establishing a den. When she was observed just after sunrise on May 5, her appearance led us to believe that she had given birth. Our belief was confirmed on May 21 when we saw 196, her mate (wolf 211), and one 3- to 4-week-old pup (wolf 344) traveling on a logging road. During the next 3½ weeks we saw pup 344 on eight occasions. Everything seemed to be going well for the family, until June 25.

I scheduled a flight for early that morning, anxious to see 344 and her parents. As soon as I tuned in 196's frequency I knew that a tragedy had occurred; her radio-collar was transmitting in the mortality mode which meant that she was probably dead. I found her badly emaciated body in her favorite den box which was in the acclimation pen that had been left opened after she was released nine months earlier. The pathologist determined that 196 had experienced difficulty giving birth and contracted a uterine infection. Ultimately the infection spread to other organs and killed her. As though he knew something bad was about to happen, her mate 211 had led 344 away from the area about 24 hours before 196 died.

On May 29, 205's mate, wolf 184, was killed by a vehicle. Within 24 hours, 205 began to show signs of nervousness. She became very active and started leaving the den for varying lengths of time. We were worried because she now had no mate to bring her and the pups food. Concerned that 211 and 205 would not be able to raise pups without the assistance provided by mates, we began a supplemental feeding program.

The situation was different for 205 and her litter. Although she was finding the food we put out, 205 still spent much time away from the den. During the afternoon of June 10, just 11 days after her mate died, 205 moved her litter.

The following morning, a motorist called and reported seeing an adult wolf and a pup along the highway where 184 had been killed. We immediately went to the site of the observation and confirmed that 205 and one pup (wolf 351) were present. We established a monitoring station to ensure that they stayed off the highway, but unfortunately, as soon as it became dark they started to move and within minutes were on the road. The pup was only about 6 weeks old and much too small to travel easily through the thick vegetation that bordered the highway. Even on the pavement 351 couldn't keep up with her mother, and on numerous occasions they became separated. Passing cars complicated the situation and we worked feverishly to haze the animals off the road as vehicles approached. In all the confusion, 351 more than once followed us not knowing where 205 was.

Eventually we had to stop traffic and escort the family up the highway. All the motorists were concerned and willingly cooperated. Fortunately, 205 directed 351 down the first dirt road they came to and the pair disappeared into the night. Within two hours they were at an area 205 knew well, favorite hunting grounds she and her mate had used in the past. This is where she would raise 351.

As the weeks passed it became apparent

that the two families were doing just fine. Occasionally we would see the animals from the air and were able to determine that 344 and 351 were the only survivors from the two litters. The supplemental feeding program continued until August at which time the pups were big enough to begin to hunt mice and rats.

As fall set in we began to make plans to capture the pups and outfit them with radio-collars. At 6 months, they were large enough to wear a collar and we needed to be able to track the animals in order to learn about their movements, sociality, and survivability. The next few months were filled with some hard-learned lessons about capturing wolves, and another tragedy.

Uncertain about pup 351's habits, we decided to shift our attention to the other wolf pup, 344. By early evening on October 14 we had established a trapline for 344, using traps that were specially designed to reduce injury to feet. We also used electronic equipment that permitted us to monitor the traps 24 hours a day. Although we had confidence in the safety of the traps, we felt we could reduce the probability of injury to near zero by removing the animal from the trap within minutes after it was captured.

Just after dark, 344 stepped in one of the traps but pulled out after a brief struggle. A second attempt also failed when the pup uncovered a trap and became suspicious.

By October 23 we were ready to try for 344 again using eight slightly larger traps. On October 25, 344's father (wolf 211) was captured, and we decided that he would be good bait to try to lure 344 near the traps. We constructed a small pen and moved him inside, then set three more traps for 344. Between the evening of the 26th and the morning of the 28th, the pup uncovered another trap. Tracks on the road indicated that she was reluctant to investigate the pen where her father was being kept. Because she seemed to learn our "tricks," we pulled the trapline, released 211, and shifted our attention back to pup 351.

On November 8, after searching for signs of 351 for a week, we set four traps on trails leading to a deer carcass. Within hours one of the traps fired; small canid tracks nearby implicated 351 as the culprit. The next day we reset the trap and added one more. Around 9:00 pm, 351 stepped in one of the traps as she moved toward the carcass. She was in excellent condition and weighed 36 pounds. We fitted her with a radio-collar, and administered vaccinations and medication before letting her go. Once 351 was "on the air," our attention immediately turned back to 344.

From mid-November through mid-December we infrequently found signs of 344. Apparently she spent very little time traveling on the logging roads. Tragically, we found her father (211) dead on December 27, having suffocated after a raccoon kidney became lodged in his trachea.

We lost all contact with 344 until January 16, when two of the local trappers reported that they had just seen a wolf about three miles south of the refuge. We investigated the site where the observation took place and concluded that they had seen 344, but a trap line failed to yield a wolf.

"Before she was one year old, she'd had enough experiences with traps to last a lifetime, and it's no wonder we had such a hard time catching her."

We lost contact with the pup until late February when we began to see her tracks near where she had been born. Confident that 344 had returned from her jaunt to the south, we set a trapline. Bad weather flooded some of the sites, and although 344 walked past several traps uncovered by the rain and triggered a third trap, our bad luck continued.

Because 344 seemed "trap-wise," we decided to spend the next few weeks establishing and maintaining bait stations. We hoped to condition her to go to specific sites looking for food. We also decided that we would rake the area around these bait stations so that she was accustomed to walking on disturbed dirt. Many trappers believe that animals determine the location of a trap by detecting the odor of recently disturbed dirt. Sharing this belief, we designed our conditioning program to "short-circuit" her senses.

From early March until mid-April we studied 344's habits as she frequently visited the bait stations. We learned that she was most wary as she approached within a few feet of the bait. This gave us the idea of setting some traps several feet from the bait in addition to setting one trap more conventionally about 8 to 12 inches away.

On April 14, we decided to again try to catch 344. By late afternoon we had 14 traps hidden at and near the bait stations and bunched in groups to take advantage of what we had learned. We found no evidence of 344 in the area as we checked traps on the 15th, and we expected the trapline to be in bad shape the next morning following a downpour. As we approached the trapping area on the 16th we found fresh tracks that indicated that 344 had traveled to an intersection where three bait stations and seven traps were located. By studying the tracks at the intersection we were able to piece together what had happened.

The wolf had investigated bait station number 1, but the single trap at the site had been uncovered by the rain and she approached no closer than a few feet. The story was the same at bait station number 2. She ignored a trap set near a scent-post we established using coyote urine (the rain had probably washed away the urine). The two traps set at bait station number 3 had both been uncovered by the rain and she had also avoided them. Then she made a mistake.

For reasons unknown (perhaps she was very hungry), she had returned to bait station number 2 and tried to get the meat by approaching from the side opposite the uncovered trap. We had recognized that there were two approaches to the meat and placed a trap along each approach. The second trap had not been uncovered by the rain, and 344 stepped squarely on the pan. She was finally caught.

We found her hiding in vegetation that bordered a canal about 15 yards from the intersection. The trap did not cause any damage to her foot; however, both front feet showed signs of old injuries that were likely caused by traps sportsmen had set for gray foxes, raccoons, or bobcats. Before she was one year old, she'd had enough experiences with traps to last a lifetime, and it's no wonder we had such a hard time catching her. She was in excellent condition and weighed 54 pounds. We attached a radio-collar, administered vaccinations and other medication, and let her go.

As we hoped, 344 and 351 did not suffer any long-term effects from being handled by humans or by being outfitted with radio-collars. Since being captured and released, both have behaved in a way befitting the wildest of wolves. Because they're radio-collared, we learn new and exciting things about red wolves almost daily. Their ability to survive in the face of adversity fills us with the hope that someday others of their kind will roam free in conservation units throughout the Southeast. Wolves 344 and 351 are living proof that there is an alternative to extinction. ⊠

Safety Up A Tree

Deer hunting is a very safe sport statistically—until you climb into a tree stand. Yet every tree-stand accident is avoidable, and these tips will help keep you from becoming a tragic statistic.

by Tom Poland

KEN TAYLOR

Tree-stand accidents have increased as the sport of deer hunting has grown more popular. A safe tree stand is still one of the most effective ways of hunting. It positions the hunter above the deer's sight-line and makes the hunter's scent less of a factor.

After weeks of oppressive heat, the season's first cold front finally has put a chill in the pre-dawn air, and the pre-season scouting and preparation may begin to pay off.

Be patient, the hunter reminds himself. If nothing turns up today, I can relocate my stand. A new spot down the trail might produce. That's the good thing about portable stands. I can always move.

The hunter waits. A rosy blush flushes the eastern sky. Soon the sun will rise over the horizon. As if from nowhere, the buck materializes. A magnificent animal with a tremendous rack emerges from behind a tangled clump of trumpet vines. Slowly, carefully, he steps into the open. Cautiously, he picks his way along the leaf-lined trail. A few steps at a time, he eases through some oak saplings. Soon—just a few more yards—and he'll enter a glade and be in range.

The air is still. The woods quiet. From his vantage point high in a pine the hunter is ready. His pulse is racing. This is the moment he's waited for. All his senses intensify. He can nearly see the buck's warm breath collide with the cool air. Imperceptibly, the hunter rises in his stand, bow up, the glistening broadhead notched. The string draws taut. The buck halts. Just one more step... one split second more and the arrow will be on its way.

The buck bolts. The dawn quiet is shattered. The arrow flies askew as the jarring noise of wrenching metal and splintering wood precedes a dull thudding collision with the earth.

Another hunter has fallen from his tree stand. What should have been the crowning moment of a long season of planning and preparation has turned into a tragedy.

Many sportsmen who are well-versed in the "Ten Commandments of Firearm Safety" take tree-stand safety for granted. Case studies reveal that every tree-stand accident could have been averted had certain precautions been made. The prudent hunter can avoid a fall. Why then, are increasing numbers of hunters suffering falls and other tree stand-related accidents?

The answers vary with the type of accident, but basically they can be categorized as poor judgment, mechanical failure, hunter error, and rule violations.

Occasionally a hunter selects a tree too

weak to hold his weight for very long. Maybe a worn bolt shears. Weather-beaten wood finally gives way. Perhaps the hunter is taking medication that makes him dizzy. Too much trust is placed in what seemed to be a stout limb. A climbing spike comes loose. An old, abandoned stand seems to be a perfect location, but proves to be a death trap.

Incredibly, some hunters caught up in the excitement of the moment actually forget they're up a tree. A hunter steps back to get a better shooting angle and falls backwards 20 feet to the earth. He is paralyzed for life.

Drowsy from prescribed medication, a hunter drifts off to sleep and falls from his stand catching his left knee in the crotch of a limb. Unable to free himself, he spends the night hanging upside down with little blood flow from the left knee down. Later, doctors must amputate his left leg.

Using a cord tied to his trigger guard, a careless hunter pulls his loaded rifle up to the stand. It fires, striking him in the head and killing him instantly.

A stand collapses and a hunter breaks his back. He crawls to his truck where he is discovered unconscious. He is lucky, though, and recovers to hunt again.

Of course, not all falls result in serious injury. Some are just plain embarrassing. Others amount to nothing more than a skin-scraping slide down the rough bark of a pine. But, increasingly, tree stand falls are outdistancing firearm accidents in severity and frequency.

The rise in tree-stand accidents roughly parallels the increasing popularity of deer hunting. Various types of stands are especially popular in the tree-plentiful South. Depending on a hunter's preference and regulations, he may choose a climbing stand, ladder stand or permanent stand: all provide an effective way to hunt.

Deer instinctively expect danger from ground level, not above, and a well-placed stand positions the hunter above the sightline. A stand also makes wind-blown human scent less of a factor, and allows a hunter to take advantage of a location where ideal ground cover isn't available.

Tree stands also yield benefits directly related to safe hunting. Downward shooting angles from elevated positions reduce the chance that a missed shot will carry far, and positioning a stand up a tree also lessens the hunter's chance of being mistaken for game.

But unfortunately, tree stands can increase the likelihood of serious injury or death unless hunters follow certain basic safety rules. The most effective guard against a fall from a tree stand is to wear a safety harness. When a stand collapses beneath you, a harness snugly wrapped around the tree's trunk will keep you from falling. The habitual use of a harness when climbing up, down and in the stand is the best precaution of all.

In addition to wearing a harness, there are safety tips specifically related to the type of tree stand you choose.

Climbing Stands

Many types of climbing stands are extremely popular. They are easy to store, easy to maintain and easy to relocate. These stands, however, offer limited floor space. They can be unstable, and they have parts that can work loose or occasionally break.

Before using a climbing tree stand, have someone experienced with that brand demonstrate its safe use. Check all hardware carefully. If possible, replace any questionable components with stainless steel or high-grade, case-hardened bolts and double-lock nuts to keep parts from working loose.

Select straight, dry trees with thick, rough bark that the stand's climbing edge can bite into. Avoid trees with smooth, slick bark, and never attempt to go up an ice-covered tree. Never climb higher than 15 feet, and always wear that safety harness.

Ladder Stands

Hunters have relied on the versatile ladder stand for many years. It's stable, easily used and can even help transport a deer out of rugged terrain. It has been used as a stretcher to bear injured hunters as well. The good thing about the ladder stand is its solid construction and limited height. You can only go so high with a ladder stand. Use a chain or a durable strap to secure this type of stand to the tree. Wear a safety strap.

Permanent Stands

The permanent stand is popular among many hunters. Properly built, it's strong and stable and offers a lot of comfort in your chosen hunting location. Many private landowners do not particularly care for nails and bolts in their valuable timber, and commercial timber farms prohibit their use. Some states are also now restricting the building of permanent stands. Here in North Carolina, it is unlawful to build or occupy a permanent tree stand on game lands. Where it's legal, be sure you get the landowner's permission before building a permanent stand on his property.

Don't wait until a few days before hunting season to throw together a shoddy piece of work. Use quality long-lasting materials such as pressure-treated lumber and hot-dipped, galvanized nails. Remove obstructing limbs that might get in the way of smooth rifle or bow movement. Building well before the season will also give deer that might be using the area a chance to forget your intrusion.

A small piece of reflector tape will make the stand visible in your flashlight's beam during predawn darkness so you don't wander around looking for your stand. You could be mistaken for game by another hunter.

Pretest the stand before hunting season without your firearm, and wear your safety belt. Inspect the stand often, and replace nails, bolts and lumber whenever you suspect their strength is waning.

When you come across an old, abandoned stand that you might be tempted to use, do yourself and others a favor and tear it down. Abandoned stands weakened by age and weather cause a lot of accidents. It's a good rule never to trust a stand you didn't build yourself.

Safety In The Tree

Regardless of the type of stand you prefer, once you're ready to hunt from it, there's another set of rules that come into play.

First, observe the principles of firearm safety. Check your firearm to make certain it's unloaded before raising and lowering it. Take the added precaution of covering the muzzle to keep obstructions out. Never climb up or down with a firearm or bow and arrows. Use a cord at least 6 feet longer than the height of your stand to raise and lower your unloaded gun or bow and covered arrows. Tie the cord around your gun stock so that the muzzle points down.

Keep in mind that certain medications cause drowsiness, and it goes without saying that you shouldn't hunt if you've been drinking. Even lack of sleep can prove dangerous.

How High Is Up?

Some hunters try to set a new record for a tree stand height, but experience has shown that 15 feet is about the ideal height for most situations. Going higher produces an awkward shooting angle. More to the point, gravity pulls objects earthward at the rate of 32.16 feet per second. A second-and-a-half fall means you'll hit the earth traveling 48.24 feet per second. How fast is that? It's the same as driving your car into a wall at 33 miles per hour except that your unprotected body takes the blow. Keep that in mind and you'll be less inclined to exceed the 15-foot mark.

Finally, common sense can do much to reduce tree stand accidents. The key is to think about what you're doing, proceed cautiously, double-check everything and make sure you're alert and capable of staying that way until you've got your feet safely back on the ground.

By then, perhaps you'll be ready to field dress that buck. ⊠

Easton Waterfowl Festival Donates $25,000

Waterfowl Habitat At Roanoke Wetlands

Written and Edited by Vic Venters

Today, North America's waterfowl populations face problems that transcend state or local boundaries and go beyond the jurisdictions of any one organization. That's why the Board of Directors for the Waterfowl Festival in Easton, Maryland, has helped fund habitat improvement work in North Carolina's Roanoke River Wetlands.

In June, the N.C. Wildlife Resources Commission received a $25,000 grant from the Waterfowl Festival that will go towards completing survey and boundary posting, as well as improving resting and feeding areas for waterfowl. The Roanoke River Wetlands, consisting of 9,108 acres in Bertie, Halifax and Martin counties, is managed by the Wildlife Commission. The grant will supplement state funds used to manage the wetlands, and provide ideal habitat for waterfowl, deer and small game.

"This gift from the Waterfowl Festival clearly demonstrates the national interest in proper management and protection of our valuable wetland resources," said Hal Atkinson, chief of the Commission's Division of Wildlife Management. "Working with both public and private groups such as the Waterfowl Festival, the Commission will continue to focus on the enhancement of waterfowl habitat in the future."

Other contributors to the Roanoke River Wetlands Project are The Nature Conservancy, the N.C. General Assembly, the Department of Transportation, Ducks Unlimited, the Nongame and Endangered Wildlife Fund, and the N.C. Wildlife Endowment Fund.

— *Angela Dorman Hill*

ANGELA DORMAN HILL

Sign Of The Times: *Hal S. Atkinson Jr., chief of the N.C. Wildlife Resources Commission's Division of Wildlife Management, shows one of the Commission's signs identifying the Roanoke River Wetlands on U.S. 17 near Williamston. The sign identifies the eight sources of funds for the wetlands.*

Sportsman's Show Set For New Bern

For the second year, New Bern will be host to the North Carolina Wildlife and Sportsman's Show. The event, set for September 22 through 24, will exhibit original wildlife art including master carvings, paintings, decoys and sculptures. Also featured will be a large gun and knife show.

As part of a special exhibit, the original paintings from the N.C. Duck Stamp and Print Program will be on display in the Bank of the Arts building in New Bern. The artwork from this contest will be on display from September 22 through October 28.

In addition there will be various demonstrations throughout the weekend, including retriever shows, archery clinics, and a hunter-safety program. A boat show is scheduled and several conservation groups will have displays. For more information, contact the New Bern Area Chamber of Commerce, Drawer C, New Bern, N.C., 28560 or call 919-637-3111.

Call Count Shows 20 Percent Increase

Dove Population Better This Year

Your blood is so hot that thermonuclear fusion seems just moments away. Overhead, the sun blazes away in the September sky but that's not the culprit — it's the eighth dove you've missed in a row that's really causing you to simmer.

Don't lose your cool, though, because it appears there will be plenty more chances to bring birds to the bag this year. According to call-count routes monitored by Wildlife Commission biologists this summer, the state's dove population is up almost 20 percent from last year's figure. By this measure, hunting should be better than last year's season when dove populations experienced a downturn in North Carolina. This decade, the state's dove population has averaged about 27 million birds.

However, weather patterns are almost as important as breeding success for the makings of a good hunt. The cool fronts that often pass through the state in late August or early September can scatter flocks and push doves south. "Cold fronts have a big influence on doves," said Carl Betsill, small game and migratory bird project leader for the Wildlife Commission. "Doves can be in a field one day and gone the next."

JIM DEAN

Dog Day Doves: *Early-season dove hunting is best before fall's cool fronts arrive. With this year's dove population up, hunting should be good this season.*

Survey Reveals Wildlife Lovers

We're More Than A Million

There are more of you than we thought. For years, the constituency of the N.C. Wildlife Resources Commission has been reported to be about half a million people, a figure based on the total number of licenses sold for hunting and fishing in the state.

However, a recent survey conducted by the Wildlife Commission shows the constituency may actually be twice that figure. Records of hunting and fishing sales, boat registrations, contributors to the Nongame Fund and subscribers to *Wildlife in North Carolina* magazine show that 1,057,089 people pay for services provided by the Commission, although some of the constituents take part in more than one activity.

According to last year's records, 400,883 fishing licenses and 229,069 hunting licenses were sold. A record 253,162 boats are registered and 77,753 people subscribe to the magazine. Also, 50,519 people hold lifetime licenses and 45,703 people contributed to the Nongame and Endangered Wildlife Fund through the state income tax refund checkoff program.

"Our constituency extends far beyond hunters and fishermen only," said Richard B. Hamilton, assistant director of the Wildlife Commission. "There are many North Carolinians who don't participate in either of those activities who subscribe to our magazine. There are thousands more than the quarter of a million registered boaters who go boating. If one person registers a boat with us, chances are he'll take his entire family with him to the water."

North Carolina has a significant revenue source in wildlife-related activities. A 1985 survey just released by the U.S. Fish and Wildlife Service shows that fishing generated $909 million dollars to the state's economy, while hunting brought in $209 million. These large revenues come from sales-and-use taxes on the purchase of equipment such as boats, campers, four-wheel-drive vehicles, food, lodging, gasoline and hunting and fishing supplies.

The survey also shows that 3.2 million North Carolinians, or 68 percent of the state's population, participate in wildlife activities other than fishing and hunting. They spend $192 million on those activities. Nationally, 140 million people participate in wildlife-associated recreation.

— Angela Dorman Hill

Hunting And Fishing Day Set

Since the turn of the century, hunters and fishermen have been at the forefront of the battle to conserve our nation's natural resources. Sportsmen first witnessed the ill effects of our expanding civilization on fish and wildlife and they provided the motivation for conservation legislation. Through hunting and fishing license fees and special taxes, sportsmen have contributed over $7 billion for conservation programs in the last 60 years.

To honor these conservation achievements, sportsmen will celebrate September 23 as National Hunting and Fishing Day. More than 14 million Americans are expected to participate in the 18th annual observance, and wildlife clubs across the state will be hosting events. Watch for details in local newspapers.

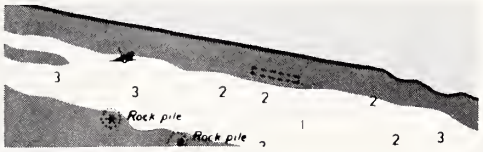
Volunteers Needed To "Sweep" Trash

Waterway And Beach Clean-Up Set

MARYBETH BIANCHI

Little Sweep, Big Sweep: *Skip Stiller, a sixth-grade science teacher at South Brunswick Middle School sent in this photo of his class cleaning up four miles of Long Beach in Brunswick County. On September 23, the public will have an opportunity to remove trash from the state's beaches, rivers, streams and lakes by participating in The Big Sweep, a one-day, state-wide clean-up. As debris is picked up, the type of litter removed will be recorded on data cards for analysis to be used later for developing educational activities to reduce pollution. Volunteers are needed! For more information contact Jane Krupnick, 512 N. Salisbury St., Raleigh, N.C. 27611 or call 919-733-7123. Promotional T-shirts for The Big Sweep can be obtained by sending $6 to the UNC Sea Grant College Program, Box 8605, N.C. State University, Raleigh, N.C. 27695-8605.*

CHART A SAFE COURSE



Graphic little symbols on nautical charts produced by the National Oceanic and Atmospheric Administration locate sunken vessels. One way boaters can keep their vessels from becoming permanent map features is to carry the latest edition charts, even in familiar waters.

When a nautical chart becomes obsolete, its further use for navigation may be dangerous. Our nation's waterways are constantly changing and many of the changes that affect navigation can easily go unnoticed.

To find out if your charts are up-to-date, write for "Dates of Latest Editions," issued quarterly and available free from NOAA, Distribution Branch (N/CG33), Riverdale, MD 20737.

Stay on a safe course with up-to-date nautical charts from NOAA.

A public service message from this publication and NOAA.

Alcohol-Related Accidents Decline Markedly

North Carolina Boaters More Numerous, But Safer

Although more than a quarter of a million boats are registered with the N.C. Wildlife Resources Commission, the number of boating-related deaths in 1988 was the lowest since record keeping began in 1972.

Last year, 24 people died in North Carolina while boating, and 140 boating accidents were reported. In 1972, there were 61 deaths and 160 accidents reported. While the number of deaths and accidents has dropped, the number of boats on the state's waters has almost tripled—from 92,607 in 1972 to 256,264 in 1988.

Wildlife officers attribute the drop in accidents to stricter laws, boating-safety education, better-built boats and an increasingly safety-conscious public. "Most of the time alcohol and boating accidents are related," said Captain Wilton Pate, who oversees the Wildlife Commission's safety programs. "For years, people thought beer was required equipment on a boat." Stiff fines of up to $500 have made it expensive to operate a boat while impaired, Pate said.

Crackdowns on boating violators have also helped make our waters safer. On Memorial Day weekend, for instance, wildlife officers launched a major enforcement operation in which nearly 1,000 citations were issued for boating and fishing violations over a four-day period.

In Operation Waterspout, wildlife officers used airplanes and patrol boats to comb lakes Hickory, Lookout, Wylie and Mountain Island for violators. Officers issued 358 citations for boating violations, 229 for fishing violations and 388 warning tickets for boating and fishing violations.

During the four-day period, officers checked 3,588 boats and 2,945 fishermen. "This special operation was an effort to emphasize the importance of following boating safety-requirements and of obeying fishing regulations," said Col. Harold Ragland, chief of the Commission's enforcement division. "We were glad to find only one boating-while-impaired violation. You'd expect to find a lot more with the number of boats we checked since it was a holiday. We've been reminding the public about the dangers of drinking and boating. Last year, eight boating related deaths were attributed to alcohol."

—Angela Dorman Hill

TOM TAYLOR

Life Savers: *Although the number of boats registered in the state has almost tripled since the early 1970s, the number of fatalities has dropped from 61 to 24 during this time. Stricter laws, boating-safety education and the increased use of equipment such as flotation vests have all helped to make our waters safer.*

Likes Two-Pronged Approach

Angler Supports "Wild" Trout

Dear Editors

As an avid trout fisherman and conservationist, I was excited to read in *Wildlife in North Carolina's* May issue of the possibility of establishing "Wild Trout Waters" and "Hatchery Supported Trout Waters." This concept has my whole-hearted support.

By establishing "wild" waters, fishermen like me could truly experience the real meaning of sport fishing. By stocking the same number of fish in hatchery-supported streams, those who want to keep their catch would have an even better opportunity, and the pressure would be taken off "wild" streams. Even a small section of a stream is better than none. For example, consider a stream in Ashe County. Several years ago the upper portion of this stream was not stocked and the pressure was very light—mostly from sport fishermen. Plenty of native rainbows and occasional browns could be had any day. One season I caught and released three golden-bellied browns over 19 inches. Sadly it was stocked and within weeks heavy fishing pressure virtually wiped out the native trout population. Posted signs now line the stream banks.

Please do not misunderstand; I realize and appreciate the rights of all licensed fishermen to fish. I'm just pointing out that the upper portion of this stream was much better as a "wild" stream rather than stocked. Please give strong consideration to the proposal and increase our enforcement personnel so the proposal would have a chance to work. Our enforcement officers are doing an amazingly good job considering their work load. No doubt they will need additional help.

E.T. Weaver
Jefferson, N.C.

Cast Us A Line...

If you'd like to share any unusual stories about wildlife or comment on the magazine or conservation issues, let's hear from you. Letters should be 150 words or less. We reserve the right to edit any correspondence. Please send to Letters Dept., *Wildlife in North Carolina*, 512 N. Salisbury St., Raleigh, N.C., 27611

Calendar of Events

On several occasions, events in this calendar have been changed or canceled without notice. Readers should check with the contact listed before traveling to an event.

September 9-10
47th Annual Gourd Festival in Cary, a free show of gourds, gourd craft, slide lectures, gourd movies and gourd music. For more information call 919-362-4357.

September 16-17
8th Annual Currituck Wildlife Festival, Currituck County High School, Barco, N.C. The festival will feature wildlife art, carvings, decoys and a photography sale and show. Also featured will be the N.C. Duck- and Goose-Calling championships and the World Swan-Calling Competition, as well as a working decoy and shorebird contest. For more information contact Nancy Sanderlin, Currituck Wildlife Guild, P.O. Box 91, Shawboro, N.C. 27973 or call 919-336-2787.

September 23
The Big Sweep. This operation will clean up lakes, rivers, streams and beaches around the state. Volunteers are needed. For more information contact Jane Krupnick, N.C. Wildlife Resources Commission, 512 North Salisbury St., Raleigh, N.C. 27611 or call 919-733-7123.

September 29 - October 1
The 19th Annual Malcolm Blue Historic Crafts and Farm Skills Festival in Aberdeen features food, traditional farm demonstrations and Confederate reenactment groups. Contact 919-944-3840 for more information.

Scouts Compete For Environment

A North Carolina Boy Scout troop is sponsoring its second annual national contest among scout troops whose goals will help preserve the environment. To win, troops earn points by having their scouts acquire conservation-oriented merit badges and/or work on environmental projects. The rules are designed to give large and small troops an equal chance to win.

Last year, Troop 382 of Jacksonville, Florida, took home the trophy, beating out scouts from Montana, North Dakota and North Carolina. The 1989 contest doesn't end until December 31, so there is still time for interested scouts to enter. For more information contact Environmental Contest, 1817 Georgia Avenue, Winston-Salem, N.C. 27104 or call 919-725-9410.

The 1990 North Carolina Wildlife Calendars Are Here!

The works of Sallie Middleton, Larry Barton, Ronald J. Louque, Bob Herr, Robert B. Dance, Mel Steele, C. Edward Swaim, Robert C. Flowers Jr., James A. Brooks and Duane Raver are featured in the 1990 Wildlife Calendar. Order yours today by returning the form below with your check or money order to 1990 Calendar, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, NC 27690-0433.

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All orders must be prepaid. We do not bill. A $15.00 charge will be made on returned checks (N.C.G.S. 25-3-512).

For fund raising and bulk rate information (10 calendars or more), call 919-733-7380. Please allow 4-6 weeks for delivery.

CALO90

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on June 30, 1989

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	47,117	$16,623,852.83
Lifetime Hunting License	472	126,971.68
Lifetime Fishing License	3,646	779,071.50
Lifetime Subscriptions to Wildlife in N.C.	1,620	218,712.59
Contributions	—	153,545.87
Fund Total	52,885	17,902,154.47
Total Interest Earned	$4,393,718.43	

Contest Recognizes Individuals, Groups

Pride In America Begins At Home

What does poaching game animals out of season have in common with cutting telephone lines and vandalizing restrooms in a state park?

They are unfortunate but common symptoms of a larger problem; the abuse and misuse of America's public lands and natural resources. In an effort to counteract these and similar abuses, the North Carolina Department of Natural Resources and Community Development is conducting its third "Take Pride in America (TPIA) Awards Program."

The TPIA awards program was established in conjunction with the national TPIA program to recognize and honor outstanding efforts by individuals and groups on behalf of our state's public lands and cultural resources.

This year's program is open to any individual, or public- and private-sector groups that have contributed to increased awareness and wise use of public resources. The activities that may be nominated for the 1989 awards cycle must have been initiated or accomplished in 1988 or 1989. Nominations are due in October and should be submitted on an official application. For more information contact John Poole, Division of Parks and Recreation, P.O. Box 27687, Raleigh N.C. 27611 or call 919-733-7795.

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Misty Morning

Early morning is a time of relative safety for these whitetails, but when the sun burns the fog from this foothill valley, the deer will retreat to the shady forests.

LITHOGRAPHY BY EDWARDS & BROUGHTON COMPANY, RALEIGH, NORTH CAROLINA

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WILDLIFE IN NORTH CAROLINA

OCTOBER, 1989 75 CENTS

Deerly Beloved, We Are Gathered

by Jim Dean

Dressed smartly in pink and green and trailing a backwash of Giorgio, the lady marched straight through the crowd to the fellow in the baseball cap.

"That your truck out there?" she asked, pointing past the shaded picnic tables to the field where the vehicles were baking in the sun. The truck, once dark blue, was caked with mud, and the rack in the window behind the seat held two scoped rifles and an umbrella.

"Yes'm, that blue one is. . ." he swallowed hard before adding, ". . .mine." As he turned to answer her, we could read the message on his cap. "God, Guns & Guts."

LEONARD LEE RUE III

"Uh oh," I whispered, nudging a companion who was picking vanilla wafers out of his banana pudding. "I think we're about to witness a philosophical discussion."

"I believe I know you," she said to the young man. "You work for my husband, right?" He nodded uncertainly and looked at his feet as though he hoped to find a convenient hollow log alongside.

"Oh, I'm so pleased to see you again," she said with a smile as sincere as it was unexpected. "My husband tells me you're a deer hunter, and I just love deer meat. It's so good for you, isn't it? I'm told it has almost no cholesterol, and I just want you to know that if you have good luck this fall and wind up with a freezer full, I wish you'd keep us in mind."

This may have been an isolated incident, but with whitetail populations at an all-time high and deer hunting more popular than ever, perhaps it's an encouraging sign that the sport is beginning to cut across social boundaries. It's now trendy to eat wild game, especially venison, and people are gearing up to hunt who never imagined they might do such a thing.

Consider the deer hunter from Sparta, Georgia, who chanced to fall in love, an affliction that's often near fatal to competing outdoor interests. The couple exchanged vows sitting in a tree stand, both dressed in camouflage. The clincher is that this was the same stand where his new bride had killed her first deer the previous season.

The domestic front is not the only place where deer hunting's popularity is making news and gaining converts. Last year, the General Motors Corporation truck assembly factory in Pontiac had to close its plants when only a handful of employees showed up for work on two consecutive days in mid-November. Plant managers did not think it was just a coincidence that these were the first two days of the Michigan deer season, but managers are paid to figure out such things.

"We approved as many vacations as we could, and we would have still been able to operate," said a spokesperson, "but unexcused absenteeism pushed us beyond the point where we could cover all the jobs. We need a better coping mechanism."

Maybe General Motors needs a better coping mechanism, but it sounds like the hunters are coping very well, thank you. Union officials pointed out that the Pontiac plant had a sizeable backlog of trucks, so no harm was apparently done. It was also revealed that forward-thinking management at a Volkswagen plant in Pennsylvania routinely declares a "deer day" holiday the Monday after Thanksgiving. What can you say about a major industry paralyzed by whitetailed deer? It's enough to make you proud to be an American.

Of course, having your favorite sport embraced by the masses has its disadvantages. Any serious trout fisherman will attest to that since the sport of fly fishing has, for the moment, also become trendy. Models are wearing fishing vests in fashion magazines, and Wall Street warlords are taking their wives to Sun Valley for rainbows or Scandinavia for salmon. A few of these newcomers look vaguely fearful that they might catch something slimy, but so what? Most of them also seem to have an genuine interest in their newly adopted sport, and they also share a growing concern for our dwindling resources of woods and waters.

You could argue that it's better to have a crowded hunting or fishing spot than no spot at all. It's also better to be understood than to be under attack.

The truth is that some of this widening support may help save not only prime wildlife habitat, but the very sports they sustain. If so, we'll all benefit. If nothing else, there seems to be a slow realization that the sports of hunting and fishing—and particularly deer hunting—are at least in no danger of sliding down the tubes for lack of interest. Nor, with proper management, are the species sought by sportsmen in danger.

If fears of cholesterol, heart disease and obesity are playing a small part in bringing some disparate elements together, that's encouraging. As the boss's wife said, venison is good for you. The realization may soon follow that fishing for trout and sitting in a deer stand is also good for you—and ironically, good for trout and deer.

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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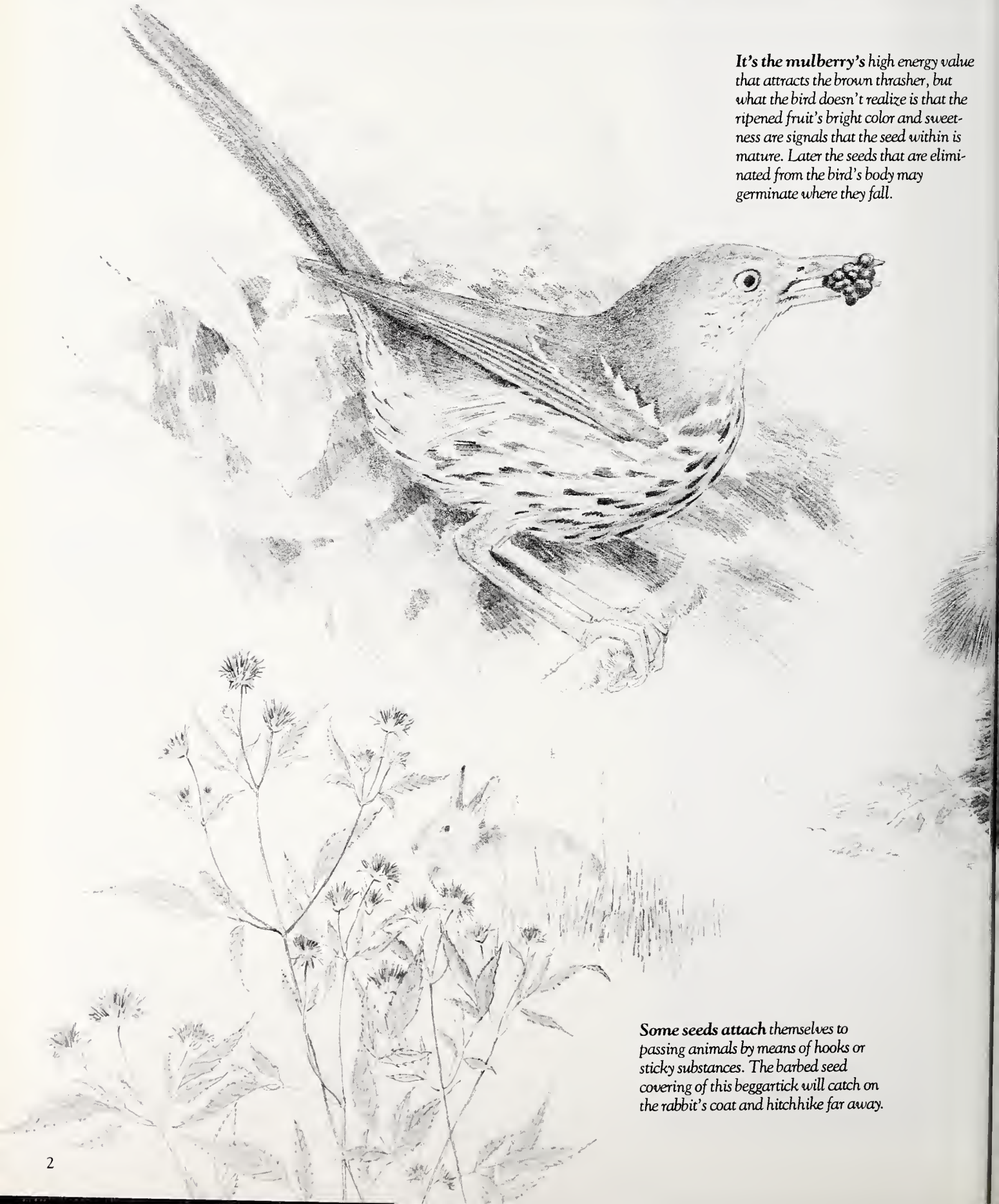


It's the mulberry's *high energy value that attracts the brown thrasher, but what the bird doesn't realize is that the ripened fruit's bright color and sweetness are signals that the seed within is mature. Later the seeds that are eliminated from the bird's body may germinate where they fall.*

Some seeds attach *themselves to passing animals by means of hooks or sticky substances. The barbed seed covering of this beggartick will catch on the rabbit's coat and hitchhike far away.*

Seed Time

written by Lawrence S. Earley / illustrated by David Williams

***Plants are not** miserly when it comes to producing seeds. A single plant will sometimes cast forth thousands of seeds, of which only a few will germinate. Once a seed is dropped, it may sail away on the wind, or float on the water far from the parent plant. In many cases, animals are employed to disperse seeds across the landscape.*

There's a feast going on in the woods now as bears and bluejays, squirrels and wood ducks gorge on berries and acorns. Wildlife is fairly exulting in the lavish provision of food in nature's larder — no other season is as fruitful. Yet if this extravagance is good for wildlife, it's also good for the plants themselves. Indeed, from the plant's point of view, its fruit is only an attractive and tasty ruse by which the real item — the plant's seed — is planted in a suitable location.

Of course, fruits are only one strategy that plants have evolved to disperse their seed. Some seeds themselves have wings, plumes and other adaptations that enable the wind or other carriers to take them afar. Some seeds are enclosed in hollow packages that float on the water. Others have explosive mechanisms that throw seed away from the parent plant. But many plants rely on wildlife to do the job, and the adaptations they've evolved for this purpose are often quite clever.

Fruits. Some plants package their seeds in fruits that all but beg to be eaten. Common summer-ripened fruits are blackberries, blueberries, black cherries and mulberries, while autumn fruits include those of dogwood, sassafras, magnolia, and greenbrier. Birds, snakes, fish, rodents and mammals eat these ripe fruits and drop the seed intact, or swallow it and excrete it later. The seed coat is hard enough to protect the seed from the digestive juices of these animals. The trip through an animal's digestive tract can even help the seed germinate.

But it wouldn't do plants any good if animals ate fruits that contained immature seed. Thus plants have evolved a variety of advertisements that alert animals when the fruit is ripe, and, more important, when the seed is mature. Immature seed is enclosed in a hard, tart and nearly colorless fruit that is generally unpalatable. Mature seed, on the other hand, is packaged in fruit that is soft and sometimes sweet, usually a deep red or purple color, and has an appetizing odor. Animals learn that these fruits are ripe and ready to be eaten, but what the plant is saying by such changes is: "My seed is mature."

Hitchhikers. Not all seeds are enclosed in edible fruits. Some are hitchhikers with hooks and spines that become attached to an animal's fur or feathers. In time, these burrs and cockles fall to the ground far away from the parent plant. Other seeds fall in mud and hitch a ride to another pond on the feet of waterfowl.

Hoarders. Still other plants disperse their seed through hoarding animals. In mast years, for example, an oak tree may produce tens of thousands of acorns. Many of them will be buried by squirrels for winter food, but some will be forgotten and a few of these may grow into new oaks. Chipmunks will also hide others in large caches, but may not eat them all. The surviving acorns may grow into trees.

***Some animals** help plants disperse their seed by hoarding them. Squirrels bury acorns for winter food. If they eat the acorn, of course, the seed is destroyed, but if they forget where it is buried the acorn may grow into a magnificent oak tree.*

There are several reasons why dispersal — by wind, by water, by animal — is so important to plants. Seeds moved away from the parent have less competition for water and nutrients, less predation from disease or seed-eaters and more opportunity for growth. And by chance, seeds may find new areas for colonization. There's no arguing with success. Through the chance actions of wind and water and the random movements of animals, including man, plants have colonized almost every available inch of the globe.

Lessons From **Wood Ducks**

Don't be fooled by gaudy garb; the wood duck is a survivor, and smart enough to evade hunters who aren't persistent and clever.

by Eddie Nickens

Mosquitoes and wood ducks: in our neck of the woods, two such disparate creatures cross paths with hunters at only one time of the year. With only 2 inches of chest waders separating me from an October dunking in a Durham County swamp, that set of circumstances had put me into an interesting predicament. My right foot was slowly being sucked into a morass of mud and muck. When I tried to free one leg, the other sank even deeper. A film of duckweed over water stained with tannin kept my attention fixed on those few inches of freeboard. I didn't think about the sweat running into my eyes, or the net of spider webs that laced my face. I thought about the mosquitoes that homed in on bare flesh as I held my gun over my head. I made an easy meal, but it all seemed to fit. I was hunting wood ducks, and the mosquitoes were hunting me. I told myself again that this was fun.

That's when the first wood duck came slipping through the trees. Forced to choose between a dry backside and an easy incoming shot, I shouldered my pumpgun and waited for the bird to dodge into an opening. The blur slipped to the right and dipped. *Now!*

I'll never figure out how I missed that bird, an easy shot to say the least, but I no longer had to worry about staying dry. I wrenched myself from the swamp's mud-grip and battled to a beaver lodge that offered freedom of movement and enough sta-

EDDIE NICKENS

Atop a beaver *lodge, Lee Davis keeps an early morning vigil for incoming wood ducks in a Piedmont swamp. North Carolina waterfowlers now harvest more wood ducks than any other single species of duck.*

EUGENE HESTER

***Flushed, a pair** of woodies take to the air. When floating rivers, hunters will often encounter wood ducks resting behind rocks or brush piles in the stream.*

bility to swing a gun. Those lucky hunters who have hunted a wood duck roost know what happened over the next 35 minutes or so: woodies streaked into the swamp with uncommon regularity. Singles, pairs, triples and flights of six, seven and more whirled through the trees like leaves driven in a high wind. At times the ducks would circle, working the swamp like mallards work decoys, the hens squealing in answer to birds already treading water—*kiweeeeee, kiweeeeeeeeek!* In 20 minutes a limit of woodies lay on the water and we watched in awed silence as the sky seemed to empty of hundreds of wood ducks winging for home, a harbinger of the coming waterfowl seasons.

For most waterfowlers, wood ducks are a by-product of a hunt for other waterfowl species. But for those hunters who know how to fine tune their techniques for woodies, a different kind of hunting experience awaits—one that shares all the excitement of big-water gunning without the required boat, dog and four dozen dekes. And luckily North Carolina offers some of the best wood duck hunting on the Atlantic Flyway—as well as liberal bag limits during the short October season. As late as 1986 the venerable wood duck comprised 37 percent of the annual waterfowl harvest in North Carolina—nearly double the percentage of the 1985 wood duck harvest on the entire Flyway.

North Carolina gunners are also blessed with a short October season designed to allow hunters to take native wood ducks and the early migrating blue-winged and green-winged teal. Before the first frost appears in North Carolina the savvy woodie hunter will begin to plot strategy for the short season. The most successful hunters will map their plan specifically for *Aix sponsa* in one of three ways: hunting potholes and sloughs, jumpshooting

creeks, and floating creeks and rivers in a canoe, johnboat or belly boat. Those hunters will also leave the ego at home, for more than a few nimrods have learned their wood duck lessons the hard way: with spent shells and empty bags.

Although roost hunting offers a front row seat to one of the award-winning performances in nature, it also handicaps the hunter: the shooting is fast, but brief; the birds generally fly to the roost near the close of legal shooting hours. (Before you squeeze the trigger, be sure you are not violating shooting hour regulations. It's also tough to find downed birds with daylight on the wane.)

Once, in a swamp still overgrown with brush and weeds during the first week of October, Lee and I tossed tennis balls in the vicinity of downed birds to keep track of their location. We even sprayed the balls with glitter so they'd shine in the glare of our flashlights when we went to look for them after the close of legal shooting time. No luck. It was still

EDDIE NICKENS

Quiet and alert, *the author drifts a black water river in eastern North Carolina. A stealthy approach, slow movement and good camouflage are the keys to success while float hunting for wood ducks.*

tough to find cripples in fading light, and the temptation for one more shot at the wood ducks piling into the swamp like doves over cut corn tests the mettle of a hunter with proper respect for the law.

Small potholes are top bets for short season wood ducks, but a different tack is best when it's woodies, not mallards, that are your prime quarry. Consider decoys. Imagining ourselves a new breed of duck-hunting commandos, Lee and I decided to give belly boats a try during duck season. We found the perfect testing grounds, a marshy cove of a large reservoir separated from open water by flooded timber. Before sunrise we poled our inner tubes to the middle of the cove, tossed out a half-dozen mallard and wood duck blocks and waited for the steady rain of waterfowl that inevitably exists in the dreamy state between decoy setting and dawn. A whistle of wings in the pre-dawn blackness told us we were at the right spot. At sunup a smudge of wings slashed through the trees. We muttered a soft feeding chuckle to bring the birds around — then silence. Minutes later a repeat performance, followed by four woodies that dipped over the blocks just within range. We held our fire, certain the birds would circle and work the dekes. The experts are chuckling at our basic folly: although gregarious, wood ducks aren't known for their decoying properties. If wood ducks drop into your decoys, chances are it's because they wanted to be there anyway, and the decoys had nothing to do with it.

But that isn't to say that decoys are a moot point for woodies. On the contrary, the practice of setting blocks for wood ducks is a growing one, and I'm convinced that decoys will at least bring interested ducks closer. Just keep in mind that the first pass may be the last. If the ducks are in range, and you feel comfortable pulling the trigger, let the shot fly at woodies that seem to take notice of your spread.

That spread should contain at least a few of a recent re-release of a little-known type of decoy for

EUGENE HESTER

A feathered jewel, *this resting drake wood duck strikes a colorful pose. Endangered at the turn of the century by habitat destruction and market hunting, wood duck populations have rebounded to become one of wildlife management's biggest success stories.*

the hunter's arsenal: lightweight rubber shell decoys, called inflatable decoys. A dozen inflatables fit into a space previously reserved for a pair of conventional dekes. And don't take the term "inflatable" at face value. I spent a good half-hour trying to figure out how to "inflate" the darn things. I filled up the bathtub with water and pondered how to get air inside the decoy's body. I'd stick my face into the saucer-sized hole on the bottom and blow, but by the time I'd get the rubber body to the water surface the air, of course, would have rushed out. The answer—not so obvious as my ignorance—was to simply hold the inflatable decoy between thumb and forefinger like a newly whelped pup. When you drop the rubber bag into the water, air will be trapped inside the bodies, rendering a realistic decoy from a limp bag of rubber.

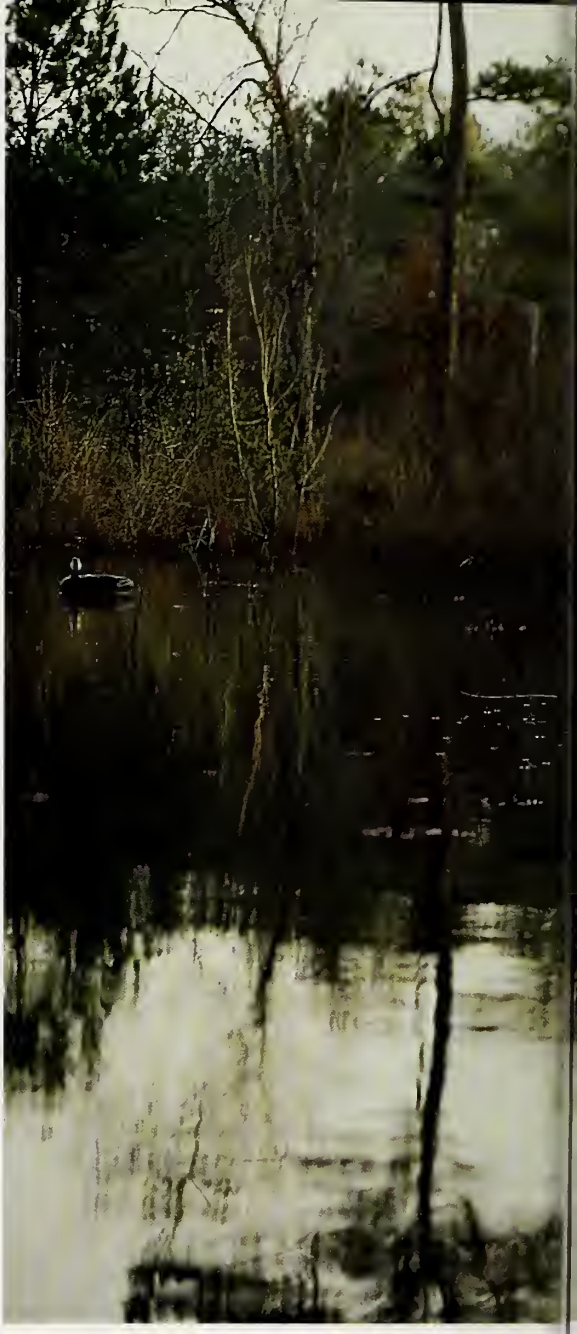
Try tossing those inflatable decoys in smaller bodies of water than you'll hunt in the latter seasons. A half-acre honey hole may hold huntable numbers of wood ducks, but such close quarters demands that you pay special attention to the terrain. Any duck will fly before sunup, but more than likely a predawn splash in the decoys means a woodie has taken the early flight out to the feeding grounds. It's important to set up where the horizon in front of you is a low one.

Once, hunkered in a bank of brush and reeds, we waited for daybreak and the accompanying cover scene of set wings and downed birds. At shooting light the woodies began pouring into a pothole on long strafing runs. Thanks to a high bank and a higher tree line on the other side of the slough the birds were invisible against a still-black background of trees etched in the grays and pinks of a lighter sky. One pull of the trigger was all it took to send the whole group of birds pawing for daylight. Had we set up with the high bank to our backs, the ride down the river wouldn't have seemed nearly so long—nor our game bags so empty.

Properly planned, of course, taking a ride down a river can be one of the most productive ways to bag a limit of wood ducks, as well as a supremely enjoyable outdoor experience. But floating small rivers and creeks in a johnboat or canoe with gun in hand also requires mastery of particular skills.

The floater's best bet is a stream that meanders through hardwood bottoms or along patches of swamp. Concealment is the key. Train your boat on the insides of oxbows and bends in the river, and be especially vigilant when approaching brushpiles or downed trees. Wood ducks will dabble in the slow current behind a fallen log only to explode from the water so close that you can't compose yourself to get off a shot. Go slow. Or better yet, slower. Feather your paddle through the water to cut down on motion. For stealth—and safety's sake—let only the man in the bow do the shooting while the man in the stern concentrates on paddling.

The best times to float for woodies are days when recent rains keep the current moving and are likely to have washed acorns and other delectables into the stream. And watch closely. Wood ducks are wary



birds with keen eyesight, but they often would rather hide than high-tail, and more than once I've found myself on the wrong end of a hard lesson to that effect. On a float trip down a blackwater creek in the eastern part of the state, Vic and I slowly eased into a wide place in the creek that hosted a small island in the middle. We knew wood ducks would be dabbling in the calmer waters, and we paddled forward with painful slowness. Nothing but ripples and fog.

"I just knew they'd be *here!*" Vic said, and he was right. At his voice a small group of woodies exploded from the other side of the island, a scant 10 yards away. Winging for the trees, the birds dodged my first two shots before the last gun-bark rolled a drake from the outside range. The birds had obviously seen us first and paddled behind the island to wait us out. Never underestimate the bird's ability to teach you a lesson or two.

It's also wise to check any potential habitat you

EDDIE NICKENS

***If you don't** mind the cold, belly boats provide an excellent way to hunt remote swamps and beaver ponds. Decoys and calls are other unconventional, but occasionally effective, tactics that can be used for taking wood ducks.*

pass. On that same trip we paddled for several hours with no shots fired and only two birds spotted. The woods floor was covered in a carpet of hip-high ferns and we beached the johnboat for a picture session. As soon as our toes hit the shore, a flooded area bordering the river exploded with wood ducks. How many woodies had we passed unseen along the way? We'd have to wait until the next year to find out.

While wood ducks often receive the most hunting pressure during the early season, the cold weather during the longer December and January seasons can play into the hand of the hardy wood duck hunter, forcing wood ducks into open channels on otherwise frozen streams. That's when jumpshooting wood ducks can be most productive, a ploy an old hunting buddy used successfully once while the rest of us cursed our frozen fingers and broke ice on unproductive big water. Scott knew of several creeks that bordered flooded timber—home turf for wood ducks during milder weather. He slept in while we gathered our gear for the long trudge to the blind, then slipped out in mid-morning dressed in full camo and wearing a big smile.

Later we were home thawing toes and singing the woes when Scott walked in with a brace of late-season woodies. Sure enough, the freezing weather had packed the woodies onto the remaining open water and the only problem, he said, was that he'd limited out in a short time and had to content himself the rest of the afternoon with walking up scores of woodies and mallards while practicing a silent swing through. And, by the way, how was our day?

Of course, Murphy's Laws were written to govern the sport of waterfowling, so sooner or later Scott will be on the tail end of a wood duck lesson—no method of tripping up wood ducks is foolproof. But tailor your tactics to the idiosyncracies of this floating jewel and you'll surely improve your chances.

WETLANDS IN THE HIGHLANDS

Small, scattered and disappearing, mountain bogs contain some of our rarest habitat and least common plants and animals. Yet we know almost nothing about these tiny, isolated worlds.

by Lawrence S. Earley
photography by Ken Taylor

They were bog people and I went with them to learn something about these, fragile and disappearing mountain wetlands. We battled through thick tangles of rhododendron, were drenched by hisses of water from fog-laden leaves. We swashbuckled through giant, face-washing cinnamon ferns, balanced on dangerously shifting hummocks of sphagnum moss, broke through to the black muck beneath and got stuck. (We yanked our feet out with great sucking noises.) A dozen lichen species on tree limbs rioted around us. Derelict tree trunks rotted under mossy coverlets. We were astonished by the beauty of grass pinks, dragon's mouths, and purple-fringed orchids. There were delicate spiders' webs hung with globes of dew, hummingbirds that probed the trumpets of Gray's lilies. Deep in the saturated sphagnum moss grew hundreds of tiny sundew plants, each with scores of sticky, sparkling traps for the unwary insect.

They were bog people, yet they knew little of what we saw. How many bogs are there in the mountains, I asked? How long have they been around? Why are some plants and animals found in one bog, but not in another? How come no two bogs are alike?

"I don't know," replied Alan Weakley.

"I don't know," echoed Alan Smith.

That made three of us.

Biologists Weakley and Smith are not apologetic that they know so little about

***A ruby-throated** hummingbird sips nectar from a Gray's lily, a rare mountain plant that occurs in Southern Appalachian bogs and also on grassy balds. The lily's long trumpets are adapted for hummingbird pollination. Sphagnum-covered floor (above) is typical of mountain bogs. Sphagnum absorbs water and provides the substrate for other plants.*

Mountain bogs *are sometimes dense with vegetation (above) or surprisingly open (right). Each bog differs from the next, although certain plants are common to them all, as is a spongy peat soil kept wet by nearby seeps. Scientists are hoping to learn why bogs differ so much.*

North Carolina's mountain bogs. "Northeastern bogs have been studied extensively and for long periods of time, unlike their Southern Appalachian counterparts," says Weakley. "Of course, botanists interested in finding rare plants have known about mountain bogs for some time." He mentions early collectors such as Asa Gray, André Michaux and Moses Ashley Curtis. "But ecologists who are interested in how these systems work, why they occur where they do, and what the controlling factors are—they've done almost no studies in our bogs to date."

Weakley and Smith are involved in a project that will advance our understanding of these processes, and possibly provide eventual protection to the best of the bogs. Smith is inventorying the known and especially the unknown mountain bogs of North Carolina through a grant to the state's Natural Heritage Program in 1988 by the Recreation and Natural Heritage Trust Fund. Weakley is a Heritage Program biologist who has been studying bogs for several years. Both scientists are aware that bogs are disappearing every day and could eventually vanish entirely from the high country. And if the bogs disappear, so will many of the rare plants and animals that grow in them.

"It's a bit like looking for a needle in a haystack," confesses Smith, who is using aerial photographs, soil maps, topographic maps and herbarium records in his searches. Despite these aids, however, bogs are awfully difficult to find.

"For one thing," says Weakley, "they're not limited to a particular topographic setting." They're often found near a creek, but red-marking promising creek locations on a topo map and then searching for them would probably turn up more rhododendron thickets than bogs. For another, bogs are generally small, too small to be seen from the side of a road. Most of them are a few acres or even less, and the largest one is only 60 acres. If you had a dollar for every acre of bog in the entire Southern Appalachians, you might be able to afford a color television, but you might have to wait on the VCR.

For some reason, the known bogs seem to be concentrated in two areas: in a band from Henderson County west to Clay County in the southern mountains, and in Avery, Watauga, Ashe, and Alleghany counties in the northern mountains. (An isolated group of bogs exists in Iredell County, in the northern Piedmont.) Over the course of three days, we worked our way from Henderson County north to Alleghany County, looking at a surprising variety of bog types.

Indeed, Southern Appalachian bogs are bewilderingly different. To a person who's never seen a coastal salt marsh, a physical description and a list of plant and animal species found there would probably suffice to let him know when he was in one. That wouldn't work for bogs. Some bogs are open, others are forested, and because of little understood local factors, each one supports a wildly diverse mix of plants.

***Biologists Alan Smith** (left) and Alan Weakley (right) are searching for new locations of mountain bogs to find out how many of these rare wetlands remain. In an Avery Country bog, a spider web strung from a pitch pine sparkles in the morning mist.*

On our first day in Henderson County, for example, we fought our way through dense forest to reach one of the finest bogs in the Southern Appalachians. Alan Weakley described it as being one of the more open bogs we would see, yet a fair number of pitch pines, maples and black gums grew there. The bushes tended to be tag alders *(Alnus serrulata)*, the rare sweet gale *(Myrica gale)*, the northern wild raisin *(Viburnum cassinoides)* and bog laurel *(Kalmia angustifolia* var. *carolina)*. Among the flowering species was one of the rarest plants in the world, the mountain sweet pitcher plant *(Sarracenia jonesii)* which is listed on the federal Endangered Species List.

The next day, in Avery County, 2,500 feet higher, we walked casually over a portion of a treeless bog featuring knee-high rhododendron bushes among rock outcrops, with haircap moss *(Polytrichum commune)* growing on sphagnum. There were no pitcher plants; for reasons that are not clear, pitcher plants grow only in the southern mountain bogs, not in the northern ones. Another portion of the bog undulated with deep hummocks of haircap moss that looked and felt as if dozens of pillows had been tossed down and mossed over. It was one of the oddest landscapes I've seen in North Carolina.

Another Avery County bog lay in a small valley, surrounded on three sides by steep slopes. It was actually three bogs that were situated on two sides of a small stream flowing through the valley. The first bog was grown up in head-high silky willow bushes *(Salix sericea)* that proved no impediment to walking. We found wonderful examples of Gray's lilies *(Lilium grayi)*, and a four-foot, purple-fringed orchid *(Plantanthera grandiflora)*. The bog on the other side of the creek, however, was dense with meadowsweet bushes *(Spiraea alba)* that fought our every step and was the driest of all three bogs. In the third bog grew red spruce *(Picea rubens)*, as well as mountain laurel *(Kalmia latifolia)* and rhododendron *(Rhododendron maximum)*. We found cranberries in flower and a variety of orchids, and it was as wet as the second bog was dry.

The differences among the bogs have

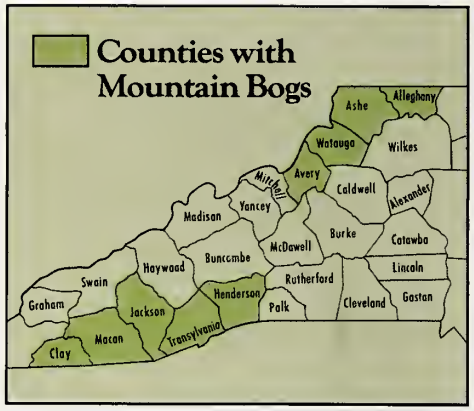
baffled Alan Smith, who is trying to set up a classification system for bogs. "At this point in my study," he says, "it appears to me that all of the bogs are so different that each one will have its own category." He admits that won't be very helpful, but so much is still unknown about bogs.

"We don't understand much about the soils, the hydrology, or the land-use history of these bogs," says Alan Weakley. "We have a pretty good list of the species that occur in them, but we don't know why some species are abundant in one bog, rare in another and absent in still another."

If the bogs are so different, what do they have in common? What makes them bogs at all and not just a wet meadow or a swamp? Though dominant plants differ from bog to bog, certain plants tend to reoccur—sphagnum moss (peat moss), cinnamon fern, tag alder bushes, rhododendron, many orchids, the insectivorous sundew *(Drosera rotundifolia)*, meadowsweet *(Spiraea alba, Spiraea tomentosa)* bushes, bulrushes, and sedges.

What is also characteristic is the wet environment of a bog. The word "bog" is derived from Gaelic and refers to wet, spongy ground consisting mainly of decayed moss and other vegetation. "In general, a bog forms when, because of topography and climate, you have more moisture entering the system than leaves it," says Weakley. The Southern Appalachians have a lot of precipitation, and flat land below slopes will favor bogs—you could get a bog on a 45-degree slope if you had a constant source of water, Weakley notes, but most bogs in the Southern Appalachians are found on fairly flat terrain. Since most of these bogs are fed by seeps, some would say that they aren't bogs at all. "Technically, all of the mountain bogs are fens," says Weakley, "because they are fed by ground water rather than rain." Traditionally, however, there are only two acknowledged fens in the North Carolina mountains, the Bluff Mountain fen in Ashe County being the outstanding one.

In the water-logged and oxygen-deprived environment of a bog, decomposition slows down. Leaves, branches and other partially decayed organic matter build up over time, resulting in accumulating layers of peat. If



you jumped up and down in a bog, you'd feel the ground quiver all around you. In the quaking bogs of Minnesota, you might want to be careful where you did this, because you could break through the surface and vanish in 30 or 40 feet of peat. The tannic acids in the peat would preserve you until someone hauled you out in 2,000 years and laughed at your funny clothes. North Carolina's bogs have only a foot or two of peat, so you can spring into the air without fear.

Sphagnum moss is actually the glue that holds the bog together. Without it, there would be no bog. Sphagnum grows where drainage is poor, not only providing a physical base on which other plants can grow, but also maintaining the wet environment by absorbing tremendous amounts of water. The number of things that inhabit even a small section of sphagnum is surprising.

One morning, in an Avery County bog, I knelt to examine a sphagnum tussock to see what was there. In an area a foot square, I found a large aquatic plant called golden club *(Orontium aquaticum)*, cranberries, a couple of bushes (bog laurel and rhododendron), and hundreds of little sundews whose sticky globules trapped insects for needed nutrients. There was a lovely orchid *(Calopogon tuberosus)* and tiny volunteer pines. Running among these plants were dozens of wolf spiders carrying their white egg cases beneath their bellies.

Because this acid, nutrient-poor environment is similar to the acid soils of the Coastal Plain, mountain bogs host a good number of plants more commonly found in the Coastal Plain. In the botanist's parlance, they are "disjunct" from their main populations. The high elevations, short growing seasons, high precipitation and intense cold of the region also promote a number of northern disjuncts.

Bogs are known to shelter deer and a variety of song birds, but little study has been given to the animal life there. Fish are nonexistent. Rare species of salamanders may be lollygagging in some bogs, for all anyone knows. No doubt the star animal attraction is the rare bog turtle, a small, dark-shelled turtle that resides in some bogs but not in all. (See "Tracking the Rare Bog Turtle", p.17.)

One of the greatest mysteries involving mountain bogs is how they were formed and why they seem to be drying up. There is much evidence that many bogs are filling in with shrubs, a process that could cause the bogs to dry out and disappear.

One morning, we visited a bog in Iredell County with Allein Stanley, a local high school science teacher who was long familiar with the site. The bog was so overgrown with trees and shrubs that it was hard to find. In the midst of a dense alder stand, we found ourselves in a seepage area with pitcher plants so weak that they just curled along the ground. "I can remember when the sun would come in here," said Stanley. "It was only 15 to 20 years ago, but the bog has changed a lot since then."

"A lot of the herbaceous plants that grow in bogs don't do well in shade," Weakley added. "They gradually die." He noted that shrubs may not only be a symptom of the drying-out process, but may also contribute to it as well. Shrubs and other woody plants are like water pumps, extracting water from the soil and pumping it to the leaves. Both Weakley and Smith are puzzled. "We see these Iredell and mountain bogs closing in and drying out on a pretty quick time scale, very quick by geologic time, and we wonder what has changed," says Weakley. He discounts the effects of five years of drought in the mountains. "The drying pattern seems to go farther back, perhaps 50 years or so," he says.

Explanations of what's happening are various, based on differing opinions about the origins of the bogs. Are bogs short-lived with a natural cycle of coming and going, of becoming wet and then drying out? One school of thought suggests that at least some bogs were formed essentially through a disturbance such as beavers. After the beavers did their work of ponding, sphagnum moss got started and, once established, the moss maintained the wetness and the bog. When the beavers were trapped out of the state in the late 19th century, according to this theory, the cycle of bog building was interrupted and bogs started to dry out.

But if these bogs were just temporary features, asks Weakley, "How did the rare plants and rare animals get around from site to site?" The Iredell County site we visited has had records of the bog turtle, for example. How could the turtle have found hidden sites that even biologists have trouble finding?

Then again, it may be that mountain bogs are of more ancient origin, remnants of an

***The strange landscape** of an Avery County bog is created by lumpy hummucks of haircap moss growing in thick, water-saturated mats a foot deep. Walking over the soft, spongy ground is like walking on pillows. Cinnamon fern (facing page) is a common bog plant that grows abundantly.*

***Mountain bogs** contain many plants that are rare in North Carolina. The dragon's mouth (*Arethusa bulbosa*) at far left is extremely rare south of Maine, Minnesota and southern Canada. In North Carolina it occurs in only four known sites. Even rarer is the mountain sweet pitcher plant (*Sarracenia jonesii*), near left, an endangered species.*

Ice Age landscape featuring many more bogs. A few bogs are known to have peat 11,000 years old. "The conditions were cooler and wetter here and bogs were more extensive throughout the Piedmont and mountains," says Weakley. "As the climate changed over the last 12,000 years, we may really be seeing these sites naturally on their way out."

End of argument? Not quite. "If they've been around since the last Ice Age, why are they closing in and drying up so rapidly only in the last 50 years?" Global climate change? The subtle effects of man on his landscape? Weakley spreads his hands in mock horror.

Mountain bogs *in spring boast colorful displays of native orchids, including grass pinks* (Calopogon tuberosus) *above. Below, the thick, fleshy leaves belong to golden club* (Orontium aquaticum), *a member of the arum family which also includes jack-in-the-pulpit and skunk cabbage.*

"You're asking me questions that no one has answers to," he says.

Make no mistake about it, the nameless natural process that seems to be drying out many mountain bogs is a toothless cousin compared to the real bog carnivore—*Homo sapiens*. If you're a discerning reader, you may have been a little discomfited by my steadfast refusal to give any more than a county location for the bogs I've mentioned in this article. You might have wanted to know exactly where I had been. Unfortunately, so would some others. Unscrupulous collectors have been known to ransack bogs for rare plant and animal species. Among the favored species are pitcher plants and bog turtles. According to biologists, illicit pitcher-plant collecting is a serious problem throughout the Southeast, with Europeans in particular sustaining a major market by their fascination with these insect-eating plants.

The diminutive bog turtle has been in demand for the "unusual pet" trade. Collectors have made deep inroads into bog turtle populations by exploiting the differences in state protection offered the turtles—it's listed as an endangered species in some of the Atlantic seaboard states where it is found, but not in all. In North Carolina, emergency protection was offered to it only this past September. "As long as there are a couple of states that do not protect the bog turtle, the turtle is not safe anywhere," says Dennis Herman, assistant curator of herpetology at Zoo Atlanta and another participant in the Heritage Program project. "Collectors will take turtles illegally out of states with regulations and, if caught, they claim that they got them from a state without protection."

According to Herman, North Carolina was blitzkrieged this past spring by collectors from Ohio who spent weeks looking for the turtles just before the emergency measure was in effect. "I'd say over 30 turtles were taken from my study bogs," he says.

Despite the losses, Herman says that the bog turtle would be holding its own if not for the physical destruction of the habitats themselves. Bog destruction by man far outpaces the natural process that's "shrubbing in" the bogs. "Bogs are getting rarer in the mountains because developers are draining and altering them," Herman says. He ticks off the construction projects that have replaced bogs he once knew: golf courses (water hazards are generally what used to be the bogs); apartment buildings; a shopping center; several highways; trout ponds.

"Our mountain bogs are in a crisis now", adds Alan Weakley, "because there are so few bogs left and development pressures are mounting. Most bogs are in the floodplains of rivers and streams, and that's just where the shopping centers and the roads and the golf courses are going." Which is one reason for the importance of Alan Smith's inventory. Scientists won't even be able to begin studying the natural dynamics of bogs until they know where the bogs are, and protection efforts will have to wait until the vulnerability of the remaining bogs is known.

The terrible irony involving these rare mountain wetlands is that it's only as the pace of bog destruction has picked up that the bogs are getting the scientific attention they deserve. One can only hope it won't be too late. ⊠

Tracking The Rare Bog Turtle

***Splotches of orange** on its neck identify the rare bog turtle.*

There never were many bog turtles, and those that survive face drying habitats and collectors who don't care.

written and photographed
by Dennis Herman

"I've got one over here and it's a honey!" That excited announcement not 20 feet from me sounded like the kind of thing you might hear from a rockhound in Cowee Valley's famed ruby mines or the emerald mines near Spruce Pine or Hiddenite. But no handsome stone or mineral had caused this sudden outcry, even though the object of admiration was both rare and beautiful. My associate had merely stooped to pick up a bog turtle, North Carolina's living gem.

Scientifically known as *Clemmys muhlenbergii*, the bog turtle is a small, rare species that lives in the sphagnum bogs and mucky wet meadows and pastures of western North Carolina. The bog turtle is identified by the large distinct yellow-to-orange blotches found on each side of the head. Light starburst markings on mahogany- or ebony-colored shells and red streaks along the legs resemble the "flash" of fire agate. Many older specimens may have smoothly worn carapaces from years of constant digging in the mud, giving the turtles the appearance of highly polished cabachon-cut gems. In some populations their shells may be pitted from annual accumulations of bog iron or algae. The bog turtle is North Carolina's smallest turtle; the largest of over 200 North Carolina bog turtles I have measured since 1980 barely exceed 4¼ inches. The small size and coloration of bog turtles play an important role in their survival.

One of the most interesting aspects of the bog turtle's natural history is its spotty distribution. Although they are found in the Northeast and in several Middle Atlantic states, they are frequently confined to small populations that may be separated by miles

***Scientists found** bog turtles in this wet meadow bog in Avery County (above). Soon after, however, the bog was drained for development (below). Habitat alteration occurs throughout the turtle's mountain range in North Carolina, endangering the turtle and ultimately, perhaps, causing its demise.*

of mountainous terrain. These unexplainable gaps are a mystery to naturalists, especially where suitable habitat, devoid of turtles, occurs within a few miles from existing colonies.

In North Carolina, bog turtles occur most frequently in the Blue Ridge Mountain Province up to 4,500 feet high. They are also found in a few isolated populations in the upper Piedmont from 600 to 1,200 feet. Bog turtles have been reported from at least 14 counties in these two provinces. They belong to the pond turtle group (genus *Clemmys*) whose fossils date from the Miocene epoch (5 to 22 million years before present). Bog turtle fossils have been found only once and they date from the Kansan Period (600,000 years b.p.) of the Pleistocene epoch. The cooling and warming trends following the Wisconsin glaciation (10,000 years b.p.) played an important role in bog turtle evolution and dispersal. As the massive ice sheets melted and receded northward, large lakes and swamps were left behind. These lakes eventually filled with peat from expansive sphagnum moss beds, and smaller bogs were formed. These relict bogs are now the favored haunt of the bog turtle. Over many centuries, wildfire and beavers kept the bogs open and provided habitat for various wetland species of flora and fauna. Although the ice sheet failed to reach North Carolina, its environmental effects were evidenced by changed climates and ecology. The bog turtle became a permanent addition to North Carolina's faunal list during this period.

The bog turtle is a controversial and intriguing species. Even after 12 years of studying and searching for this elusive turtle in North Carolina, I am amazed at how much more there is to learn about it. Many naturalists consider the bog turtle the United States' rarest turtle species, while others think that its rarity is attributed to its secretive nature and spotty distribution. The fact is, the bog turtle is very difficult to find even when conditions seem perfect. Bog turtles are usually found basking on grassy tussocks on warm spring days. Unlike most aquatic species, bog turtles usually do not bask fully exposed to the sun, but often rest beneath a grass clump with only the rear of the shell exposed or in a shallow pool with only the top of the carapace visible. They seem to prefer very muddy habitats where springheads send cool water trickling through the bog in slow-moving shallow rivulets. Being relatively poor swimmers, they rely on their alertness and ability to quickly burrow out of sight in a "tails up" posture at any hint of danger. Meadow vole runs and muskrat tunnels are often used while foraging or otherwise moving about in the grassy terrain.

From late April to early June, bog turtles are active at or near the surface. As the summer sun bakes the wetlands and the surface water begins to evaporate, bog turtles become less active and spend much of their time in the cool deep mud, coming to the surface in the early or late periods of the day.

When the autumn nip returns to the air, the bog turtle's surface activity increases. I have found them in Henderson County as early as April 7 and as late as September 9 at times ranging from 7:30 a.m. to 6:50 p.m. After mid-June, they are very difficult to find as the dense undergrowth of catbrier and tearthumb becomes almost impenetrable.

Many biologists think bog turtles need warmer temperatures than other turtles for sustained activity, but most of my observations refute this. I have found bog turtles active at relatively cool temperatures on many occasions. Once on a misty April morning in Macon County, I encountered a pair mating when the mercury barely reached 60° F. The species seems to become increasingly more active during or immediately following thunderstorms and may be found crossing roads or wandering along rocky streams near their boggy homes.

Water levels often fluctuate seasonally in the bogs, so bog turtles, unlike most turtles, have developed the unique adaptation of feeding both on land and in water. Being omnivorous, they feed on a variety of small vertebrates, invertebrates, plant materials, and occasionally on carrion. Males are aggressive predators and will devour any creature they can overpower. However, earthworms and slugs are the bog turtle's favorite foods and on many occasions they have been observed in muddy depressions or hoofprints feeding on these invertebrates. I have often facetiously considered bog turtles to be "the cattle egrets" of the turtle world for their habit of foraging in fresh, mucky livestock tracks.

Why are these small cryptically colored turtles unsafe in their dense natural surroundings? The answer is quite simple. Bog turtles have many enemies that prey upon their eggs and young, and rarely on full-grown adults. These predators include raccoons, foxes, skunks, opossums, dogs, various birds, and even large snapping turtles that may occasionally eat a young turtle. Although seldom eaten by predators, adult bog turtles are easily mutilated by the sharp-clawed, toothy bandits of the night—raccoons. Missing toes, feet, legs, and even tails are commonplace among bog turtles in many populations. In a small Transylvania County bog, an associate and I happened upon an injured female turtle that was missing her tail and three legs. She died shortly thereafter from the injuries.

With all of these natural dangers to face, bog turtles must deal with an even more formidable foe—Man. Developers prize the bog turtle's wetland haunts once they are filled in or drained. In 1985, while under a North Carolina Nature Conservancy contract, I was conducting a survey in Avery County where bog turtles had not been reported since 1917. Late one afternoon, I discovered a small meadow bog nestled in a valley partially hidden by two hillsides of Christmas trees. After securing the owner's permission, I began searching an open grassy area with deep mucky rivulets. I suddenly came upon a young male bog turtle feeding on an earthworm and, shortly thereafter, I found an old adult female as she was digging in the mud in the usual tails-up position. I approached the landowner, showed him the turtles, and discussed the significance of my discovery. He seemed genuinely concerned about the turtle's plight and I left contentedly thinking that I had done my good deed. My thoughts returned to this pristine bog during the cold winter months and I looked forward to returning in the spring.

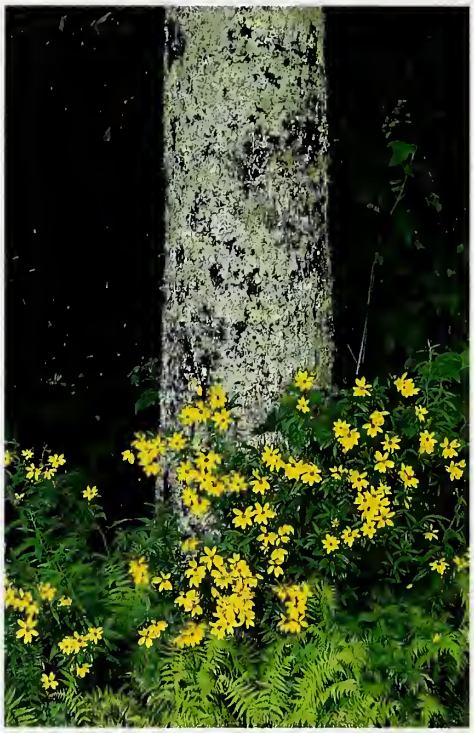
***Rarer than the** sight of a bog turtle is a view of its hatchlings. These tiny turtles are 1 inch long. How these diminutive creatures are distributed among bogs situated so far apart is a mystery.*

Exactly one year later, along with Jim Warner, a colleague and bog turtle researcher from Connecticut, I returned to this site. As my truck rounded the curve and the bog came into view, my heart sank. A trench 6 feet wide and 4 feet deep had been channeled through the middle of the bog. Along both sides of the ditch were heaps of gravel-laden soil. Upon searching the rapidly draining terrain, we found the old female that I had found the previous year. She was sitting on a pile of stony rubble and seemed disoriented as I picked her up. I carried her to a small boggy area that remained nearby and placed her in the mud. As we watched her dig out of sight we wondered what her future might hold. Would she and any other survivors migrate to more suitable sites up or down the valley, or would they manage to survive in the dying habitat?

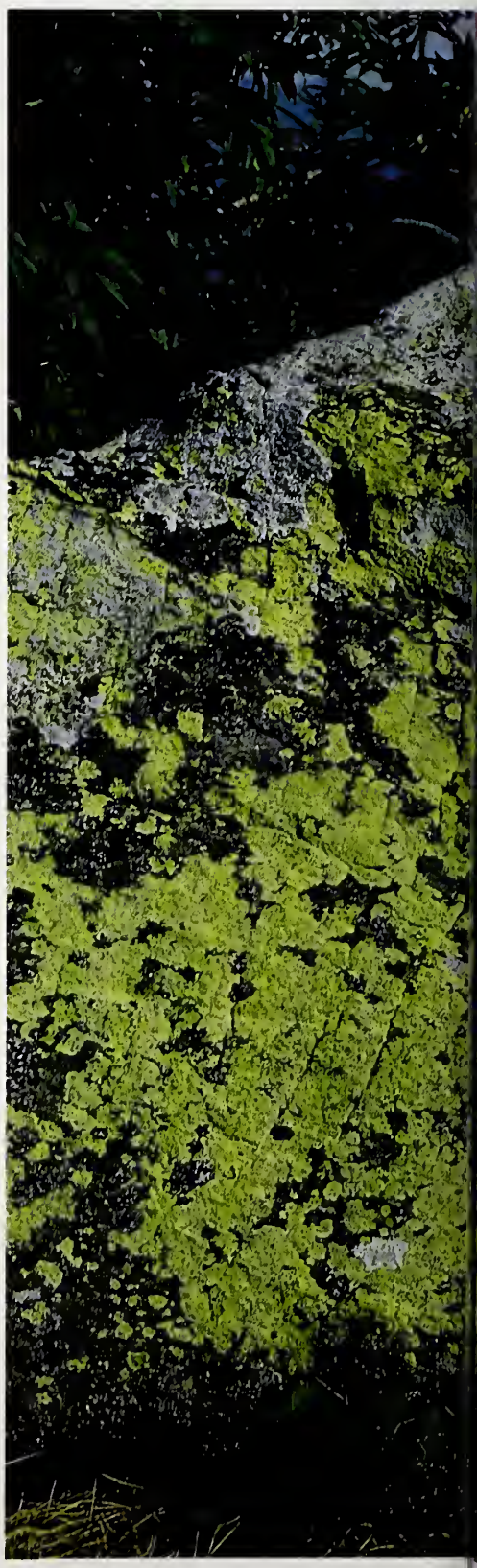
What happened here is not an isolated scene in North Carolina. It is occurring throughout the turtle's range. Because of these natural and man-made threats, the bog turtle has become a threatened species. Fortunately, most states, where bog turtles occur naturally, now protect them. They are listed as an endangered or threatened species, making it illegal to collect, possess, import, transport, or sell them. North Carolina recently placed the bog turtle on its special concern list, thus providing it some protection. Federally, the bog turtle is under review as a threatened species. Populations that are located on National Forest land or fall within National Park boundaries are protected from collecting and harrassment. Several significant sites on privately owned land have been either acquired by the North Carolina Nature Conservancy or registered with the North Carolina Natural Heritage Program. What does the future hold in store for *Clemmys muhlenbergii* in North Carolina? Only time will tell.

Next April, I will eagerly look forward to visiting the favored haunt of North Carolina's living gem. And like the thousands of anxious rockhounds that swarm over the state's many gem mines, I will search in excited anticipation until I can exclaim, "I've got one right here and she's a honey." ⊠

Life on the Rocks



*A **lichen-covered** tree is a familiar sight in in the Southern Appalachians. The flower is the yellow coreopsis* (Coreopsis major).



Lichens are primitive, colorful, common, useful—more than enough to interest the curious naturalist. And not all lichens cling to rocks.

written and photographed by Harry Ellis

The vastness of the universe—the mountains, the oceans, the stars, and the rivers that run from the uplands to the sea—has always held me in awe. But from these great panoramas of water, earth and sky, my thoughts inevitably return to the comparatively little things in the realm of nature: to trilliums and hummingbirds, to ferns and butterflies, and to that beautiful and alluring world in miniature—the lichens. They are hardy pioneers among the plants, with a geological history going back to the very springtime of life itself on our planet.

The study of lichens gives one a unique window on the world, for at any season, with nothing more than a good hand lens or magnifying glass, an outdoor stroller can view some of nature's finest and most exqui-

A yellow map *lichen sprawls over a huge boulder on Roan Mountain. Lichens actually consist of two quite different plants — an alga and a fungus. The fungus supplies moisture and stability for the alga, and the alga manufactures food for both plants.*

***Lichens come** in three forms. The British soldier lichen* (Cladonia cristatella), *above, and the beard lichen* (Usnea strigosa), *below, are examples of fruticose lichens. These lichens are upright with spikes, clubs or cups. One of the most beautiful of all lichens, the British soldier, took its name from the red coats of Revolutionary-era English soldiers. Foliose lichens, such as the* Parmelia conspersa *(top), growing on a rotting log, are flat and leaflike but with free borders. Crustose lichens are thin, flattened crusts clinging tightly to rock or wood surfaces. In the photo at center, yellow and gray mark the presence of two species of crustose lichens.*

site handiwork. Lichens grow almost everywhere on the world's surface, from the wind-swept peaks of Antarctica and the frigid slopes of the Himalayas to the burning desert floor of Death Valley, and, of course, to the tree trunks and boulders of our own backyards. The only places they cannot survive are in the polluted air, smoke and noxious gases of our industrial cities.

Lichens are the most primitive land plants on earth, but just as worthy to be called plants as lilies or oaks. Not a single organism, the lichen is really a dual form of life, a combination of two very different plants—a blue-green alga and a fungus. Together they form a unified body, or thallus, that bears no resemblance at all to either partner. In this fruitful marriage, their tissues can be distinguished only by a microscope. The alga was better able to survive by mingling its cells with the enveloping fungal threads, or hyphae, which supplied essential moisture and shelter from environmental extremes. The alga, going about its green business of photosynthesis, manufactured food products for both.

This union produced a form of life that was neither an alga nor a fungus but an entirely new plant never known before—a lichen. Just how or when this partnership came about is a mystery lost in time, but it may have begun back somewhere in the Devonian, over 300 million years ago.

Lichens spread their soft mantles over storm-scarred mountainsides, on slopes too steep for mountain goats. They cover great seaside cliffs, encrust our stone walls, and when we die, they scrawl epitaphs on our tombstones in spreading runelike patterns that no man can read. Some varieties are relatively large and easily observed with the naked eye, but the vast majority, when seen from a few feet away, appear as small, insignificant splotches on rocks and trees. Under the lens they become intricate cascades of color. Many species have an almost imperceptible growth rate, with a cluster on a boulder growing outward at less than a millimeter a year. There are colonies under observation that are estimated to be over two centuries old.

More than 20,000 species of lichens are known worldwide, 2,000 from the North American continent, with 230 identified in the Great Smoky Mountains alone. Though, for the most part, we must leave their identification to experts, there are still many forms with definite characteristics and patterns that make the task relatively simple. But, in this field, there is much disagreement even among the authorities, for lichens have not given up all their secrets. For example, the exact relationship of the alga and the fungus in a lichen is not completely understood. Some believe that the association is largely parasitic, that the fungus gains most from the alliance and gives little in return. The most generally accepted view among researchers, however, is that the partnership is one wherein both participants benefit.

Three basic varieties of lichens are recognized—the crustose, the foliose, and the fruticose forms. The crustose types are very thin, flattened crusts that cling tightly to the rock or wood surfaces. The foliose forms are flat and leaflike but with free borders. Among the most beautiful are the fruticose varieties. They are usually upright and shrubby with intermingling stalks, but may be spikes, clubs, or cups.

The principle means of reproduction in lichens is by *soredia*, tiny dustlike granules that, when carried by the wind to other places, produce new lichens. Generation also occurs when plants break up into smaller pieces and are blown away. While most lichens produce spores by the billions, this form of reproduction is probably the least common method of propagation, for unless the disseminated spores land alongside compatible algal cells, new lichens are not formed.

These primitive plants colonize the naked rocks and secrete acids that eat out tiny pits and pockets in the stone. Crumbs and flakes break off and settle in the crevices or fly away in the wind. Slowly, but surely, these lovely plants wedge themselves in the cracks, prying, prizing and chipping away at the mighty cliffs. Water seeps in followed by frost and freezing. Eventually the lichens die, decompose, and mingle with the disintegrated rock to create pockets of humus, where mosses, at first, and later, ferns, flowering plants, and even trees can find a foothold. In the process known as *ecological succession*, the simplest and most primitive plants establish themselves first, with the higher and more demanding forms to follow later. Thus, by creating favorable sites on the forbidding rocks and preparing the way for others, lichens have been assigned a significant role in the vast scheme of things.

In various ways, lichens benefit both animals and man. Many kinds of birds make use of them in the construction of their nests. The ruby-throated hummingbird shingles its tiny 1½-inch nest with greenish-gray lichens. Saddled on a horizontal tree branch, the nest resembles a lichen-covered knot. Tree frogs, certain salamanders, insects, and spiders that live among these mottled growths, gradually develop camouflaging, lichenlike color patterns as a survival advantage. Interesting examples are the rock-loving grasshoppers (*Trimertropis saxatilis*) that live on the lichen-encrusted rocks at high elevations in our mountains. In dappled shades of gray and green, they blend so well with their surroundings that unless they make a quick movement, it is almost

***Birds sometimes** make use of lichens for nesting materials. This quarter-sized hummingbird nest is shingled in lichens and is saddled precariously on a narrow tree branch.*

impossible to detect them. Some of these lichens are themselves very beautiful, and, especially when seen interspersed with colorful mosses, bright mushrooms or wildflowers, are as attractive and pleasing to the eye as any plants can be. And, in our rushing, stress-ridden world, is anything more needful or useful than beauty?

In the late summer of 1988, while walking a section of the Appalachian Trail that crosses Roan Mountain, I had the occasion to observe and photograph a few of the most interesting and notable forms of lichens. Although the previous day had been one of wind and storm, the morning of my walk dawned clear and bright, with the promise of a fine day. But within a short time after I had parked the car at Carver's Gap and set out on my walk up the spine of the great ridge known as Round Bald, following the trail in a northeasterly direction, the sky became overcast and a dense, creeping fog settled in. With a visibility of only a few feet, there was a feeling of isolation, of being cut off from the rest of the world.

Here, for some miles, the Appalachian Trail winds across grassy, almost treeless ridges, linking major North Carolina scenic peaks as part of its 2,000-mile, cloud-piercing pathway from Georgia to Maine. All along the trail, huge quartzite boulders were overlaid with the attractive, bright-yellow crusts of map lichen (*Rhizocarpon geographicum*) that spread over them like maps of nations. Also covering some of the rocks were several species of greenish-gray foliose lichens of the genus *Parmelia*. Probably the most numerous of all lichens, these are the ones we so commonly see covering rocks and tree trunks from our dooryards to the summits of the highest mountains.

Groping my way upward, I spotted a tuft of old man's beard lichen (*Usnea barbata*) hanging from the branch of a small, dead buckeye at the edge of the trail. Though this form appears to be rare in the Roan Mountain region, a week earlier I had found it growing in abundance in the Linville Gorge Wilderness area, where it hung in long festoons from both dead and living trees, giving the woods a hoary, supernatural appearance.

In some places along the trail, reindeer lichen (*Cladonia rangiferina*) grew in large cushion-shaped masses. This grayish-green reindeer lichen is the major food of caribou and reindeer in the frozen north. When viewed close up, it has the appearance of multi-branched reindeer antlers in the miniature. A rainy day is the perfect time to observe lichens, for during wet weather they absorb water and come alive with a green and silvery freshness, a deeper, richer color, and an almost tropical lushness.

A red salamander (Pseudotriton ruber) *hides under a mass of reindeer lichen* (Cladonia rangiferina). *Some salamanders, insects and spiders that live among lichens develop lichenlike camouflage to hide them from predators or potential prey.*

Crossing Round Bald, I followed the trail up the next high ridge, to Jane's Bald. There was now a light mist of rain falling, with every leaf dripping. In the dim, gray light, Carolina juncos flitted through the thorny vegetation, voicing their tinkling, bell-like notes, and, once, with deep gutteral croakings, a pair of ravens flew low overhead, barely visible through the veil of fog. Near the summit of the ridge, I came upon several clusters of bright-red British soldier lichens (*Cladonia cristatella*) rising from beds of haircap moss. They were so-named because their bright fruiting knobs reminded early botanists of the scarlet coats worn by British soldiers during the American Revolution.

In several places the ground was studded with hundreds of light-green pixie cups (*Cladonia pyxidata*). When viewed through a good lens, they are as lovely as any plants can be. I also found the pink earth lichen (*Baeomyces roseus*) with a spreading gray thallus and delicate pink fruiting knobs.

Once, late in the afternoon, the canopy of fog briefly parted and I found myself walking in bright sunshine, with a blue sky overhead and ranges of purple mountains receding into the distance. But within minutes, the curtain closed again, and the fog returned more dense than before.

Surprisingly, throughout the day I met quite a number of hikers on the trail. Several of them were well beyond middle age and into their senior years. I talked to the two who were in their mid-seventies, undaunted by the adverse weather and delighting in the outdoor adventure. Conversing with them, I was amazed at the fires of wonder and enthusiasm that still burned so brightly in their youthful minds and eyes. This green world of nature, living and imperishable, beckons to us all, to go and see, to hear and feel, to marvel and to participate. I am reminded of a story that I have been hearing for a long time in slightly differing versions, though all with a remarkable similarity. According to the accounts, there is, in a remote corner of the English Countryside—somewhere in the Cumberlands, I think—an old crumbling gravestone that bears these majestic words:

The Wonder of the World,
Nature's beauty and power,
The shape of things,
Their colors, lights, and shades.
These I saw.
Look ye also while life lasts. ◇

SHIFT TO SEA DUCKS

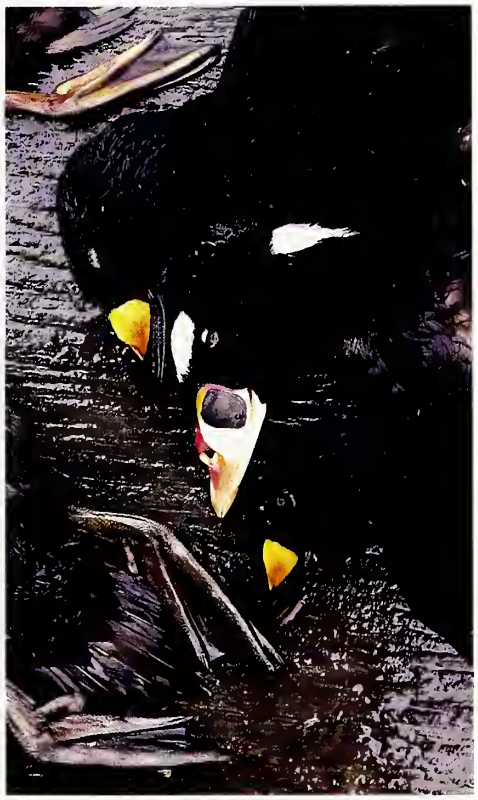
Scoters and other sea ducks are common and surprisingly good to eat, so why not give them a try?

written and photographed by Joel Arrington ©1989

In the gray morning light, they'll first appear as a flying formation of tiny black specks. Within seconds, they'll be on you, their wings carving the air, their streamlined bodies streaking low over the decoys. They're sea ducks, and North Carolina waterfowlers are beginning to discover that they provide excellent sport.

A traditional target from New England to Chesapeake Bay, sea ducks have not yet become important species for Tar Heel hunters. These waterfowl include scoters and oldsquaws, which, together with eiders, hunters collectively refer to as sea ducks. While eiders do occur in North Carolina, few migrate much farther south than New England. Most wintering oldsquaws remain in Chesapeake Bay, so our main sea ducks are scoters. Three species comprise by far most of the sea ducks that use the Atlantic Flyway. They are the surf, white-wing and black scoters. Despite the name, these diving ducks are not found only in the ocean. They may find their way to the extreme western shores of large bays and at least as far south as Georgia.

Decoys, decoys and more decoys help hunters lure sea ducks into range. Commercial sea duck hunting operations such as this one (left), place hunters in boat blinds surrounded by rafts of decoys. When cooked properly, sea ducks (below) such as these scoters are good table fare.



On the Atlantic Coast, sea ducks are most often seen as they migrate along the beaches and a few miles offshore. With short wings set well aft and beating fast, they fly in long strings low over the water. Sometimes 50 or more will make a string, each bird appearing coal black at a distance. Up close they have surprising coloration.

In Chesapeake Bay and Pamlico Sound, the predominant sea duck species is the surf scoter, although all three occur. Some of Georgia's lower sounds can have large winter concentrations of black scoters.

Since they are boreal forest nesters, scoters escaped the effects of the 1988 drought, according to John Tautin of the U.S. Fish and Wildlife Service's Office of Migratory Bird Management. Their nesting locations are high in Canadian arctic and subarctic regions and in Alaska.

With few exceptions, hunting pressure on sea ducks has been insignificant. Less than 6 percent of ducks killed in the Atlantic Flyway in recent years have been sea ducks. Consequently, bag limits have always been liberal, usually seven in aggregate per day. Sea ducks decoy well and the season is long. Most hunters are surprised to learn they are quite good to eat despite a diet of mostly marine animals like crabs, shrimp, mussels and clams.

One of the nice things about sea duck hunting is that it can be good even on calm, bright days. Indeed, because most hunting is from boats, it can be dangerous to hunt when the wind kicks up big seas.

Sea ducks tend to raft up, sometimes by the thousands, and remain in one place for days or weeks at a time. Experts say the best locations are between rafts so that hunters can intercept birds trading back and forth. On days with heavy boat traffic, birds keep moving. North Carolina requires hunters to set up at least 800 yards from shore, and they may have to invest a lot of time in scouting to determine the best location.

Where hunting has not yet become intensive, as in western Pamlico Sound, hunters often use scaup decoys and fill out their stool with strings of bleach bottles spray-painted black. Everyone agrees that the more decoys the better.

There are patented sea duck calls, but a credible and workable sound—similar to "burrrt"—can be made on a mallard call. However, in my experience, calling is the least important aspect of sea duck hunting.

Commercial operations in Pamlico Sound may employ a trawler that tows a boat-blind. The guide anchors the blind, puts out the decoys, then runs off a half-mile or so to watch clients with binoculars. He returns when it is necessary to pick up downed birds.

Flagging can be effective. A white T-shirt or rag waved briefly at birds as they fly by can attract them within range.

Sea ducks are good-sized birds. Adult males might weigh 2 to 2½ pounds. Number 2 or larger steel shot will serve you well, with another pocket full of sixes for cripples. Because the birds will often dive when crippled, it pays to shoot a downed bird as long as it has its head up.

One advantage to sea duck hunting will quickly become obvious. It's one waterfowling sport that hasn't attracted big crowds and lots of competition. ⊠

Red Foxes May Be Hardest Hit By Coyote Expansion

Coyote Pups Discovered In State; Population Expected To Spread

Written and Edited by Vic Venters

They've come to North Carolina, they're breeding, and they'll eat just about anything. Watermelons, cantaloups, deer, mice, rats, rabbits, birds and countless other species are fair game. Even the persimmon's appalling taste doesn't slake their voracious appetite.

It's the coyote we're referring to, a familiar pest in the West, but an animal that's arrived in North Carolina only this decade. This spring, biologists with the N.C. Wildlife Resources Commission confirmed coyotes are now breeding in North Carolina after a litter of coyote pups was discovered in the eastern part of the state.

Perry Sumner, furbearer project leader for the Wildlife Resources Commission, picked up two 4- to 6-week old coyote pups after they were captured by farm workers at a den site on a Jones County farm. While adult coyotes have been sighted in eastern North Carolina and have been suspected of reproducing since the mid-1980s, these are the first documented North Carolina-born pups.

Although the coyote is traditionally associated with the cactus and sagebrush of the Old West, the adaptable canid has been expanding its range east and south over the past several decades, filling the ecological niche left by the demise of the wolf. While the main population of coyotes is present in other southeastern states and is spreading through Tennessee toward North Carolina, biologists said this particular population of coyotes was probably the result of houndsmen or fox hunters releasing the animals for additional sport.

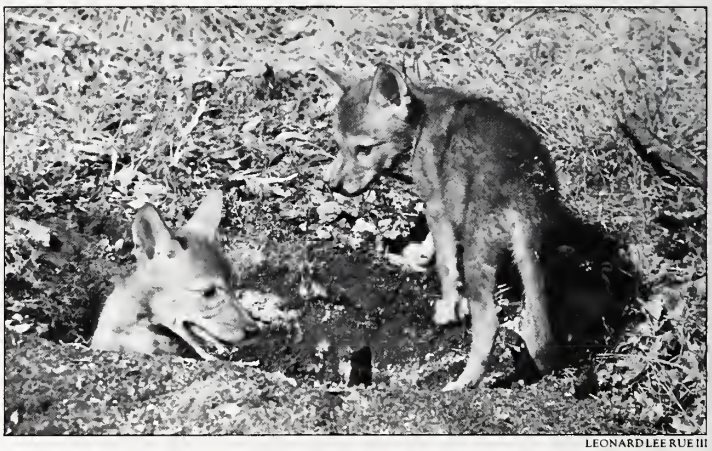
There have been previous sightings of coyotes in Jones, Craven and Beaufort counties. Biologists expect the population to expand and eventually spread over the entire state. Their impact on North Carolina's native plants and animals will vary, depending on the species. Ironically, red foxes, a favorite quarry for houndsmen, may be the hardest hit. "The biggest negative impact will be on the red fox," Sumner said. Coyotes either kill or drive red foxes out of their territory. Gray foxes, which can climb trees to escape, can co-exist with coyotes in reduced numbers. Biologists also fear that coyotes may harm the fledgling red wolf population in the Alligator River National Wildlife Refuge by breeding with and compromising the wolves' genetic purity.

Because coyotes prey on deer, turkeys and rabbits, they will not be a favorite species with hunters. Fawns are especially vulnerable. While studies have shown that coyotes can limit deer herd densities, it's fortunate that coyotes have an adaptable, omnivorous appetite, thus lessening their impact on game animals. "Coyotes don't focus on one particular prey item," Sumner explained. "You'd also be surprised how much vegetation they eat. During the time of year they can get persimmons, they seem to eat little else."

However, this varied appetite will not make them popular with farmers either. Coyotes find livestock, poultry and certain crops tasty. "They have a fairly big impact on watermelon farmers down in Georgia," Sumner said. "They'll bite the melon, apparently to see if it's ripe or not, and this ruins it for the market."

Unfortunately it seems North Carolinians are going to have to get used to living with the coyote. While the animal is classified non-native and afforded no protection under law, control programs have historically been failures — in part due to the coyote's legendary cunning, and also because of its rabbitlike reproduction. "Coyotes seem to be able to adjust their reproductive potential to the amount of food and cover available," Sumner explained. "You can kill lots of coyotes, but the ones that are left just have more young."

The Wildlife Resources Commission is interested in documenting the coyote presence in North Carolina. Report known populations or killed animals to Perry Sumner, P.O. Box 5479, New Bern, N.C. 28561.



LEONARD LEE RUE III

Clever Coyotes: *Pups like this were found in eastern North Carolina this spring, confirming that coyotes are now breeding in the state. Biologists expect the population to eventually spread over North Carolina.*

Calendar Of Events

On several occasions, events in this calendar have been changed or canceled without notice. Readers should check the contact before traveling to an event. Listings for the calendar should be sent at least four months in advance.

October 6 – 8
The 11th annual North Carolina Waterfowl Weekend at the Armada Hotel in Nags Head. There will be exhibits of art, photography and decoys, a decoy painting contest, and an auction. For more information contact the Outer Banks Woman's Club, Box 102, Kill Devil Hills, N.C. 27948 or call (919) 441-5388.

October 7
The 3rd annual Simmons Sea-Skiff Day will be held in Wilmington in celebration of the locally-built boats. For more information contact the New Hanover County Museum, 814 Market St., Wilmington, N.C. 28401 or call (919) 341-4350.

Tops Half-Million Dollar Mark

Nongame, Endangered Species Fund Up

North Carolina's Nongame and Endangered Wildlife Fund has passed the half-million mark for the first time ever. Contributions to the Nongame Fund through the state income tax refund checkoff program for 1988 were at an all-time high of $440,062. Donations to the fund for the 1988-89 fiscal year totaled $6,189 while revenue from the sale of nongame wildlife art prints totaled $6,523. Federal aid added $47,516 to the fund, bringing the total amount to $500,290.

Figures provided to the N.C. Wildlife Resources Commission by the state Department of Revenue show contributions have reached nearly $1.75 million through the tax checkoff program over a five-year period. Each year, North Carolina residents may check a line on their state income tax form and designate any or all of their refund to the Nongame and Endangered Wildlife Fund. The Fund is used by the Wildlife Commission to manage and protect nongame wildlife and species that are endangered, threatened or of special concern.

Records also show that more and more taxpayers are checking the block for the Nongame Fund. The number of contributors has increased from 36,216 in 1986 to 46,588 in 1988. Those contributors are giving an average of $9.44 per person. That amount is up 32 cents per person from 1987-88.

This funding increase will allow the Commission to continue works in progress and initiate a colonial waterbird management project.

— Angela Dorman Hill

Former Fisheries Biologist Honored

Compliments For Cape Carnes: *Artist Duane Raver and former commissioner Eddie Bridges have donated this painting of black crappies to Cape Carnes to honor the retirement of the former fisheries biologist supervisor for the Piedmont region. Carnes served over 30 years with the Wildlife Commission in the Division of Boating and Inland Fisheries. Bridges has also donated 500 prints of the painting as a free bonus to those purchasing lifetime subscriptions to* Wildlife in North Carolina. *Each print, which measures 12 inches by 14 inches, will be signed by the artist. The prints are offered in a folio and are printed on high quality, acid-free paper. The prints are available after October 1 and will be offered as long as supplies last.*

Field Notes

Season openings or closings this month:

Dove	Closes Oct. 7
Rails, Gallinules and Moorhens	Closes Nov. 10
Eastern bow and arrow deer	Closes Oct. 7
Western bow and arrow deer (except Yancey County)	Closes Oct. 7 Opens Oct. 16 – Nov. 18
Central bow and arrow deer	Closes Nov. 4
Northwestern bow and arrow deer	Closes Nov. 11
Eastern muzzleloading deer	Oct. 9 – Oct. 14
Western muzzleloading deer	Oct. 9 – Oct. 14*
Eastern Gun deer	Oct. 16 – Jan. 1
Wild Boar	Early season Oct. 16 – Nov. 18
Raccoon and opossum (Western)	Oct. 16 – Jan. 31
Raccoon and opossum (Eastern)	Oct. 23 – Feb. 28
Gray Squirrel	Oct. 16 – Jan. 31
Fox Squirrel (only in 18 counties see *Regulations Digest*)	Oct. 16 – Dec. 30
Ruffed Grouse	Oct. 16 – Feb. 28

* Correction to September's 1989-90 Hunting Season Roundup": Listed above are the correct dates for western muzzleloading deer season.

Information on bag limits, either-sex hunts and other regulations may be found in the 1989-90 *North Carolina Inland Fishing, Hunting & Trapping Regulations Digest.* Migratory waterfowl regulations unavailable at press time. Check with license agents or write the N.C. Wildlife Resources Commission after Oct. 1, 1989.

The 1990 North Carolina Wildlife Calendars Are Here!

***With such artwork** as Bob Herr's "Break In the Mist" featured above, the North Carolina Wildlife Calendar is sure to sell out again this year.*

The works of Sallie Middleton, Larry Barton, Ronald J. Louque, Bob Herr, Robert B. Dance, Mel Steele, C. Edward Swaim, Robert C. Flowers Jr., James A. Brooks and Duane Raver are featured in the 1990 Wildlife Calendar. Order yours today by returning the form below with your check or money order to 1990 Calendar, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, NC 27604-1188.

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CALO90

Population Appears Healthy

Grouse Harvest Holds Steady

You don't have to look at the statistics too long to tell that grouse hunting in North Carolina is a sport for the dedicated. In addition to having to battle some of the sharpest briers and steepest slopes in the state, ruffed grouse hunters often come home empty-handed.

The N.C. Wildlife Resources Commission's fifth annual avid grouse hunter survey for the 1988-89 season shows that the average party of avid grouse hunters bagged 10.45 birds over 15.45 hunts during the season. That works out to .68 birds killed per party, per trip. Last year's bag was up slightly from the 1987-88 season, when parties averaged .64 birds bagged per hunting trip. Each party averaged just under two hunters.

Despite the low bag, Carolina sportsmen can be thankful for what appears to be a relatively stable population of ruffed grouse in the state. Hunter harvest of grouse has varied only slightly since the survey began in the 1984-85 season. An estimated 16,000 North Carolinians harvest about 28,000 grouse per year, although that number varies from year to year and the number of dedicated grouse hunters is considerably below the 16,000 mark.

This stable grouse harvest is in marked contrast to the harvest figures for the more popular bobwhite quail, a game bird whose populations have dropped in the past several decades and shown marked population swings in the 1980s.

Keep in mind that these statistics were obtained from avid grouse hunters who are probably better than the average hunter who only casually pursues the "king" of upland game. Obviously, the experience of getting outdoors with a close friend and a good (or not so good) dog motivates most grouse hunters, rather than the number of birds killed. In these days of diminishing small game and migratory waterfowl populations, perhaps there's a lesson to be learned in that example.

LEONARD LEE RUE III

***Keeping A Steady Beat:** The drumming noise of the ruffed grouse is a familiar sound in North Carolina's mountains. The state's grouse population appears to be healthy, as measured by consistent hunter harvest.*

Statewide, Local Fox Bills Enacted For 1989-90

Although the N.C. General Assembly enacted a statewide fox management plan this year, North Carolina still has a variety of fox laws. The new statewide law provides a hunting season with firearms for gray and red foxes in some areas of the state east of I-77. In those counties not regulated by local laws, the season for taking foxes with a gun will begin with the N.C. Wildlife Resources Commission's established small game hunting season which opens Nov. 18 and will run through Jan. 1. A daily bag limit of two foxes and a season limit of 10 foxes were approved by the Wildlife Commission on Aug. 28, 1989.

In a separate law, the state Legislature extended to July 1, 1991, the authority of the Wildlife Commission to set hunting and trapping seasons in 10 counties. Those counties are Brunswick, Caswell, Clay, Graham, Henderson, Johnston, Macon, Sampson, Stokes and Tyrrell. The season for taking foxes with traps or firearms in these counties is Jan. 6 through 27. The season limit is five foxes and tagging requirements are enforced. A special permit is required to take foxes in these 10 counties and must be obtained prior to taking the foxes.

The Commission will issue permits to obtain the five tags for these 10 counties through a permit application. For applications, write Fox Harvest Permits, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611. Hunters and trappers must obtain the tags before the season.

Regulations regarding fox tagging during regulatory seasons established by the Wildlife Commission and seasons set by local law for harvesting and selling foxes remain unchanged. Tags are not required during the statutory season for hunting foxes with firearms, or of those who hunt foxes with dogs only, or who plan to live trap foxes for sale alive. Any fox trapped or killed in permit counties must be tagged at the site before being moved. In some counties with local fox laws, fox tagging is not required until they are sold.

The current rule maintains that foxes killed by motor vehicles or by other accidental means must be buried. Foxes killed for depredation may still be sold if fur-tagging requirements are met.

Local fox laws exist in many counties and supersede state law. These local laws contain varying seasons, bag limits and tagging requirements. Hunters and trappers should inquire about local laws before hunting and trapping foxes in any county in North Carolina.

—Angela Dorman Hill

Population Estimated At 15,000

Turkey Population Growing

When it comes to producing gobblers, North Carolina is no turkey. For the sixth consecutive year, the state's wild turkey harvest increased, indicating to N.C. Wildlife Resources Commission biologists that the population is still increasing.

Reports from hunters across the state showed that 1,270 wild turkey gobblers were taken during the April 8 through May 6 season. That's a 23 percent increase over last year's harvest of 1,032 birds. In 25 of the 45 counties where turkeys were harvested this year, more turkeys were taken than last year. Counties along the North Carolina and Virginia border especially showed an increase in turkey harvests.

Biologists say the Commission's turkey restoration program and a springtime gobbler-only hunting season have contributed to the turkey's comeback.

During the early 1970s, the Commission launched an intensive wild turkey restoration program to replenish the state's dwindling turkey population. Biologists trapped and released wild turkeys in a restoration area, allowed them to reproduce, then as populations increased, trapped more birds and released them in another location to re-establish another population. Since 1970, 1,100 wild turkeys have been released on these restoration sites.

When the program was accelerated in 1970, the state's turkey population was estimated at 2,000 birds. By 1980, the population had jumped to 8,000 birds. Now, it is estimated at more than 15,000.

Although the largest turkey populations in North Carolina are currently found on the Camp Lejeune Marine Base, on the Roanoke River bottomlands, and in Caswell County, the numbers of birds in the mountain region have increased dramatically in recent years.

—Angela Dorman Hill

The Wildlife Endowment Fund Report

The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27611.

Status on July 30, 1989

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	47,340	$16,814,427.52
Lifetime Hunting License	485	131,177.03
Lifetime Fishing License	3,675	772,178.04
Lifetime Subscriptions to Wildlife in N.C.	1,653	233,667.80
Contributions	—	155,722.39
Fund Total	53,153	18,117,172.78
Total Interest Earned	$4,517,024.74	

Three First Places; One Second Place

Commission's Publications Win Awards

Four publications by the N.C. Wildlife Resources Commission — including *Wildlife in North Carolina* magazine and its wildlife calendar — have won national awards.

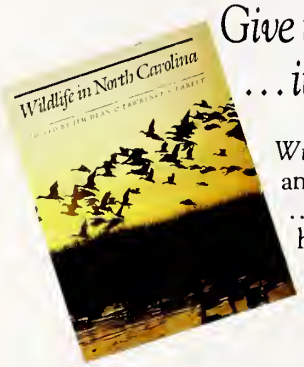
The Association for Conservation Information Inc. (ACI) gave first place honors to the *North Carolina Wildlife Calendar* and a special publication on bird houses that appeared in the December 1988 issue of *Wildlife in North Carolina*. Also receiving a first place award was *North Carolina WILD Notebook*, a conservation education newsletter mailed eight times each year to teachers in the state. The publication is used by teachers as a lesson guide for environmental and natural history instruction.

Wildlife in North Carolina won second place in a competition with magazines from 20 other states. Michigan's publication claimed first place honors while Nebraska's magazine finished third.

The Commission's wildlife calendar is an annual publication that features works by well-known wildlife artists. The bird house publication was a special one-time insert that provided detailed instructions on building bird houses and feeders for different species of birds. The publication proved very popular with the public.

ACI is a league of state and federal wildlife agencies in the United States and Canada. The Wildlife Commission's Division of Conservation Education has won several awards in recent ACI competitions.

— *Angela Dorman Hill*



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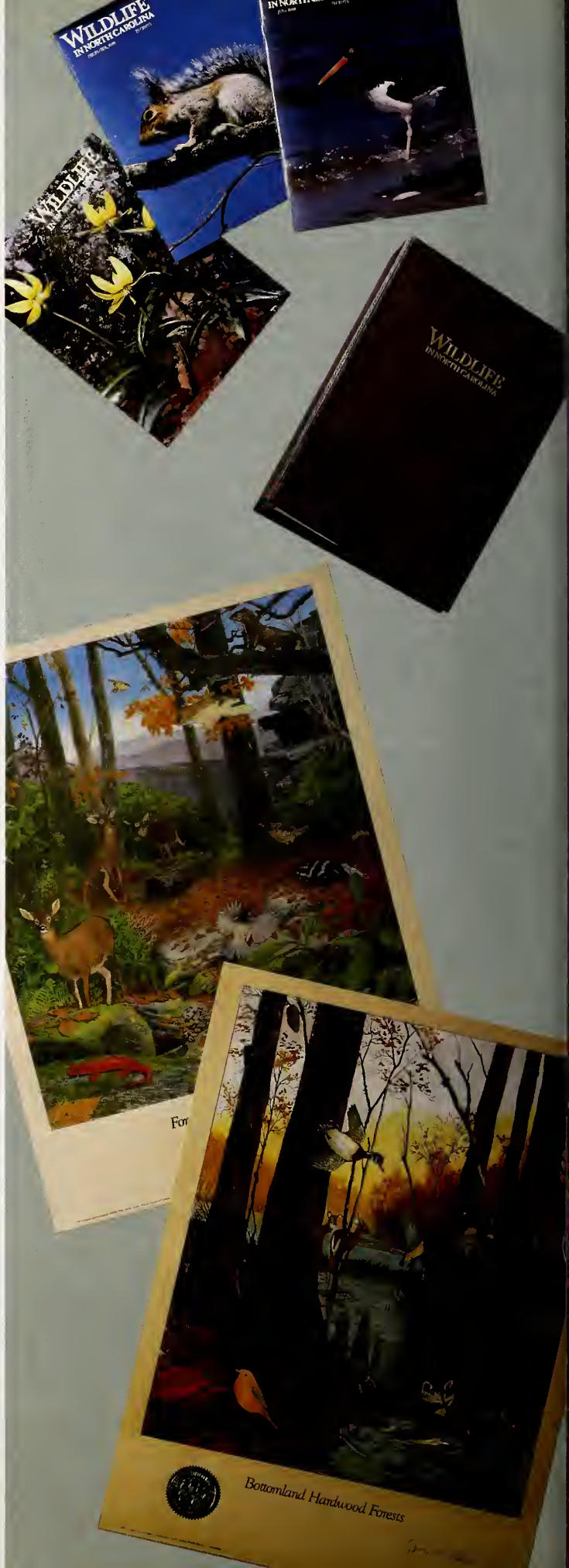

Even Santa reads *Wildlife In North Carolina*. Wouldn't your friends enjoy a gift subscription, too?

(To order, see center insert pages 16-17.)

MELISSA McGAW

Taking A Break

At first glance, this colorful male wood duck looks as though it has only one leg, but it has tucked the other foot under its breast feathers. Many waterfowl species and shorebirds rest in this way.

LITHOGRAPHY BY EDWARDS & BROUGHTON COMPANY, RALEIGH, NORTH CAROLINA

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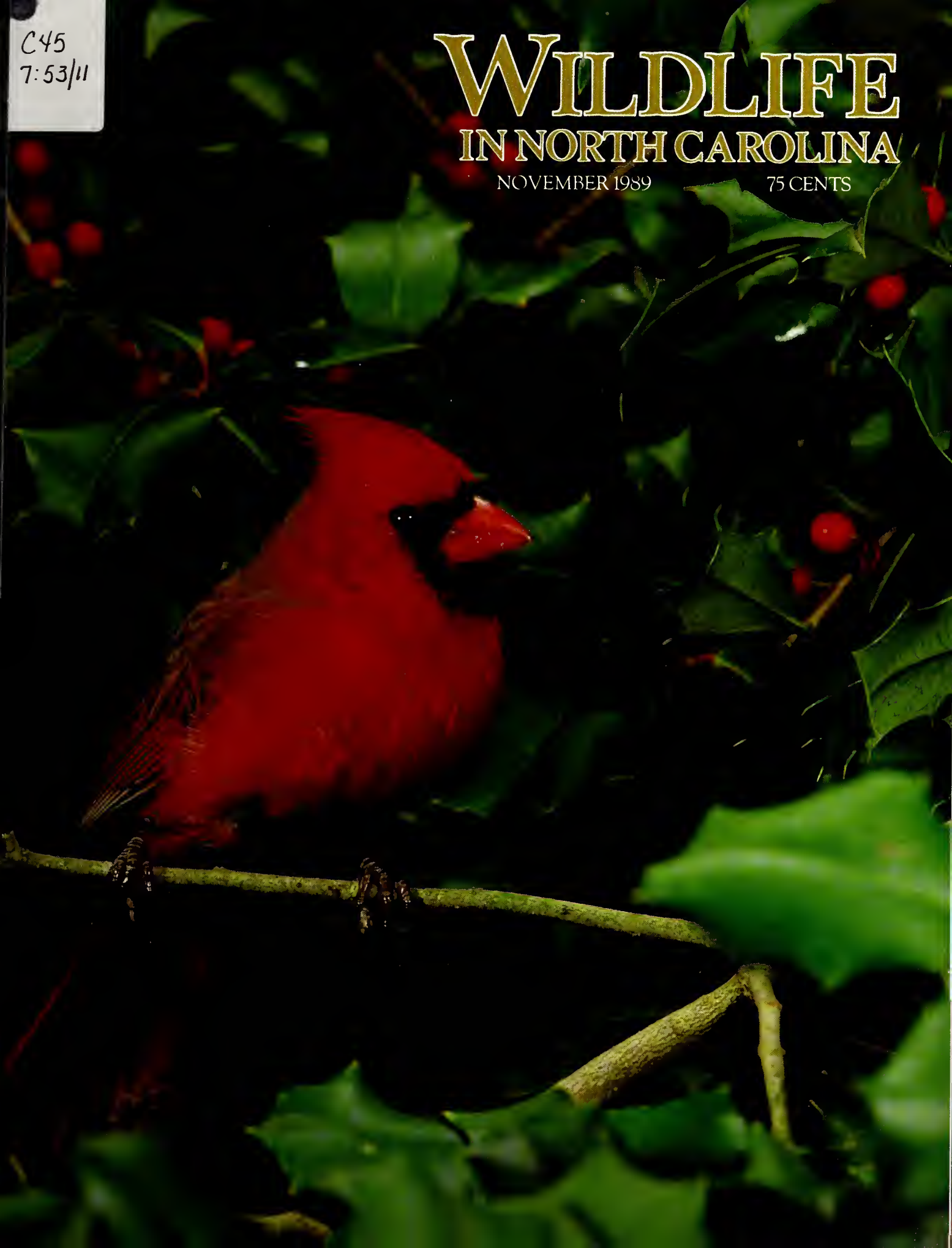

Real Ducks, Fake Ducks

by Jim Dean

For the third time that morning, there were ducks looking at our decoys. We sat tensely, heads down, leaving the inevitable drip on the end of the nose unwiped until it hung like a bare light bulb. The flight, six or eight birds, swung across the point from our right, skirted the misty line of outside cypress, and headed directly toward us. Then, just out of range, their resolve seemed to falter. They didn't actually flare, but seemed to slip away discreetly like ladies excusing themselves to the powder room. Moments later, they were a smudge of black in the distance, heading rapidly away.

"They couldn't have seen us that time," said my son, Scott. "We were absolutely still. Do you suppose there's something wrong with our decoys?"

JIM DEAN

We stood and looked at the set, trying to picture it as a duck might. What could be wrong? After all, we had carefully made most of the decoys of juniper and basswood the previous summer. They looked great to us, but we were certainly prejudiced by the time and money we'd poured into them. Yet surely, we thought, a proper duck would stop to admire our carving skill, rather than visit some miserable molded plastic or rubber fakes.

Nor could we blame it on the weather. The temperature hovered in the teens, and a brisk wind rattled the dry reeds shielding the blind. Dawn had revealed a sullen sky and a lake almost entirely iced over. In other words, it was a perfect morning.

Two hours earlier in the dark, we had laboriously chipped out a circle in the nearly inch-thick ice, sliding the loose plates under the unbroken sheet to open up a rough circle of dark water where our decoys danced on the black wavelets. It looked so inviting that either of us, had we been ducks, would have readily pitched into the middle and preened our camouflage. But the real ducks weren't buying it. They were shopping, to be sure, but we were yet to see the color of their money.

Frustrated, we resorted to the old family ritual of exchanging old and piteous duck jokes to pass the time. "Will that be cash or charge?" the store owner asks the duck who has just bought some Chapstick. "Just put it on my bill," answers the duck. Or we posed waterfowl riddles. "Could a blind duck find a duck blind?" Yes, it does get old rather fast, even for us, and especially on a day when there seems to be no reason to have to resort to such foolishness. We don't ask much, just a visit and perhaps a shot. Even when ducks were more numerous, we had already begun to approach duck hunting more as an exercise in tradition than anything else. There have been too many seasons when ritual was the only reward.

We stood again and looked at the decoys. In the distance, ducks were still trading along the horizon, meaning we could possibily anticipate another chance as long as the weather held.

"I think I see the problem," I said, "and if it doesn't work, it will at least give us something to try. We may have too many decoys in that small pothole. Some species of ducks won't fly over sitting ducks to land, and they also need open landing spots. You couldn't cram a real duck in that pothole with a shoehorn."

We waded back through the floating shards and picked up a dozen of the decoys, positioning only six of the best in a curving line near one edge of the ice, and leaving the rest of the pothole open like the deck of an aircraft carrier. From the vantage of the higher blind, we viewed our repairs.

"There's plenty of room now," Scott said. "I think we may be onto something here."

Thirty minutes elapsed, and then a pair of scaup wheeled around the distant point to our right. They came straight at us for perhaps 500 yards, never wavering, while our nerves knotted like the rubber band in a balsa airplane. When they set their wings confidently, we both missed easy shots.

A few minutes later, from the deep corner of the marsh, half a dozen widgeon slid over the trees and were headed for the open lake when they apparently spotted their juniper brethren nestled in the cozy tub in front of us. They peeled off like dive bombers, buzzed us once, then lowered their landing gear. This time, we each managed to get one.

Several other times that morning, we had ducks over our decoys. Twice, they came from behind us and we didn't see them until too late. Another time, we inadvertently spooked an interested flock when we stood to stretch our legs. We also passed up a shot at a female mallard out of concern for the mallard's current low population.

But what had so instantaneously transformed our decoys from duck repellents to duck magnets? We considered the various possibilities, naturally dismissing dumb luck. Finally, we arrived at the likely answer. Was it possible that we had used our keenly developed waterfowling skills to quickly identify a problem and solve it in an exemplary manner? We voted on it. It passed unanimously. We will not entertain any sizeable body of past evidence to the contrary.

November 1989
Volume 53, Number 11

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Health, and Natural Resources

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *A male cardinal perched in a holly is a fairly common sight, but cardinals are one of many birds that have declined in numbers in recent years. Photograph by Steve Maslowski.*

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Many birds that *migrate in spring northward through the mid-continent or Atlantic coast fly southward in fall over the Atlantic Ocean. These birds include the lesser golden-plover, the Hudsonian godwit and the blackpoll warbler (see small map).*

The most heavily *used migration route, especially by songbirds, is the "Trans-Gulf" route, by which birds fly directly across the Gulf of Mexico. Species using this route include the ruby-throated hummingbird, the rose-breasted grosbeak and the chestnut-sided warbler (see small map).*

Species wintering *in the West Indies or the Northern coast of South America generally enter the United States via Florida. Included are the Cape May warbler, the black-throated blue warbler and the bobolink (see small map).*

Most birds *that migrate into the western United States do not fly over water, though some cross the Gulf of California. The majority of songbirds that breed in the western United States migrate through central Mexico.*

For most neotropical *migrant species, the wintering range is much smaller than the breeding range. Thus, an acre of habitat loss in the tropics is often equivalent to 5 to 10 acres of habitat loss on the breeding grounds.*

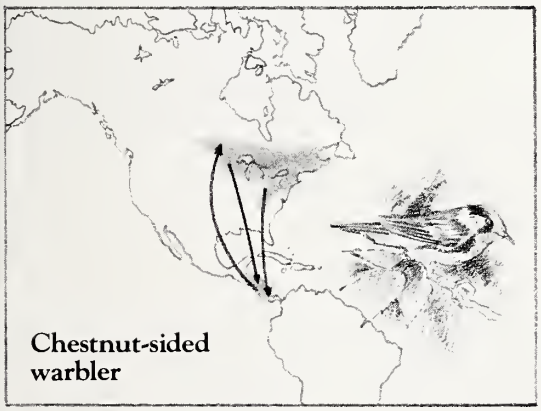
The broadwinged hawk *(see small map), yellow-breasted chat and other species that breed in the eastern United States avoid crossing major bodies of water. They hug the Central American land mass on their migrations.*

Neotropical birds *winter in Central and South America, using six main routes to migrate and return. Arrows on the large map show the six routes, and captions indicate some of the birds that fly them.*

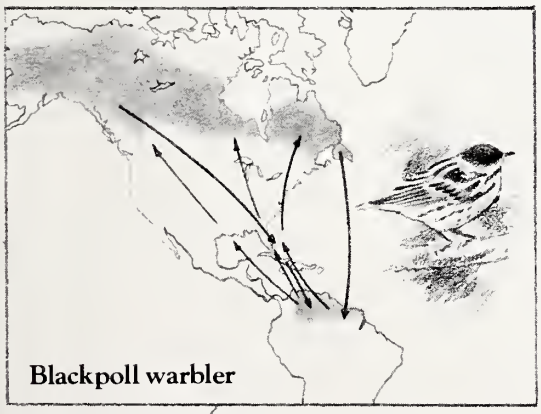
Neotropical Migrants

written by Harry E. LeGrand, Jr. / illustrated by David Williams

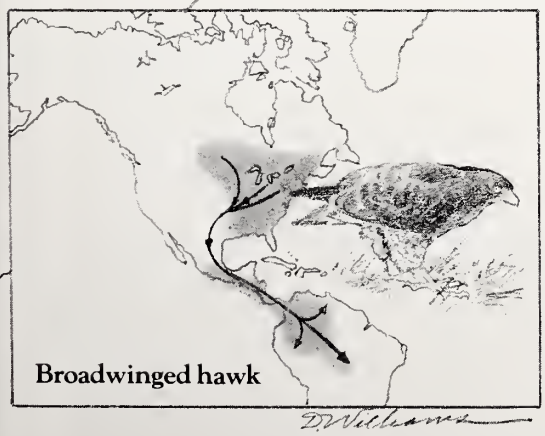
Bobolink



Chestnut-sided warbler



Blackpoll warbler



Broadwinged hawk

Have you ever wondered how many birds that breed here in North Carolina also winter in the tropics of South America, Central America, and the West Indies? Of the 220 species that nest regularly in North Carolina, at least 100 of them winter primarily south of the United States. Most are songbirds that winter in the tropical forests, where insect food is available to the migrants during the winter season. Because they winter in the New World tropics (as opposed to those in Africa or Asia), they are called "neotropical migrants."

There is great concern about populations of all neotropical birds, not just the migrants, owing to widespread clearing of the rain forests in the past 10 to 20 years. Surveys in North America show a decline in neotropical migrants, and tropical deforestation is strongly believed to be the major culprit (see "Wanderers in Trouble," p. 4).

Warblers form the largest group of neotropical migrants. Of the 25 species of warblers that breed in the state, at least 20 winter essentially in the neotropics. Thrushes, tanagers, orioles, buntings, flycatchers, vireos, hummingbirds and swallows are among other groups of birds that are considered neotropical migrants.

The neotropics are believed to be the evolutionary center for most of the above groups of birds. Many more species of these groups are present there than north of the tropics, and most of these tropical birds are nonmigratory. Thus, neotropical migrants can be thought of as "natives" of the tropics that happen to spend their summer months in the United States and Canada.

Neotropical migrants do not all breed or winter in the same regions. Some species (e.g., blackpoll warbler and gray-cheeked thrush) nest in the spruce and fir forests of Canada; others (e.g., hooded warbler and wood thrush) nest in the hardwood forests of the eastern United States; and others (e.g., upland sandpiper and bobolink) nest in grasslands over much of the northern half of the United States. Some species winter in the West Indies, others in Central America, and a surprisingly large group winters in northern South America.

Not only do the breeding and wintering ranges differ among the neotropical migrants, but the migration routes or corridors also show many differences. The most heavily used route, both in spring and in fall, is the "Trans-Gulf" corridor. In spring, millions of birds move northward and converge on Mexico's Yucatan Peninsula. Because most of the neotropical species migrate at night (nocturnal migrants), foraging and resting during the day, they depart the Yucatan at dusk and fly nonstop 400 to 500 miles across the Gulf of Mexico to the United States. This trip generally takes about 18 to 20 hours for most birds. Other frequently used routes are called "Circum-Gulf;" birds avoid crossing the Gulf of Mexico by migrating along the West Indies and Florida, or by migrating through Mexico into Texas, New Mexico, Arizona and California.

Generally speaking, the birds that migrate during the daylight hours (diurnal migrants), such as hawks and swallows, tend to fly over land rather than water. Most hawks migrate by using thermals and other wind and convection currents that are available over land surfaces but that are infrequent over water. Swallows forage on insects taken in flight, and thus, they are one of the few groups of birds that feed as they migrate!

by Lawrence S. Earley

WANDERERS *in trouble*

The cardinal, mockingbird, bluejay, towhee, brown thrasher, flicker, meadowlark and many other favorite bird species are losing ground to habitat destruction both here and in the tropical rain forests.

Oh, spare us more bad news! You can poison our water and spoil our air and drain our marshes and clutter our coastline with tacky condominiums. You can even tell us, as scientists have recently, that our beloved dogwood tree may be infected with a deadly fungus, that climate changes may dry up our wetlands, and that acid rain is slashing our striped bass populations. But don't tell us that our songbirds are disappearing, too. Say it ain't so.

Sadly, it is so. There seems to be no doubt that the populations of once common birds are plunging. Nearly 20 bird species that nest in North Carolina have suffered major losses over the past two decades, with many of these losses accelerating in the past decade. Since 1966, the population of loggerhead shrikes has fallen by 95 percent; mockingbirds by a scarcely believable 45 percent; cardinals by 28 percent; bobwhite quail by 52 percent; and meadowlarks by 53 percent. Nationwide, the figures say the same thing: many of America's songbirds are in trouble.

If it was chemical contamination that threatened a "silent spring" in the 1960s, this time scientists are blaming loss of habitat—breeding habitat along the East Coast, and, perhaps more startling, deforestation in the tropics where many migratory birds winter. Strange as it may seem, habitat changes a continent away may be playing a major role in silencing our birds.

"It looks serious," says Sam Droege, one of the team of researchers from the U.S. Fish and Wildlife Service and the National Zoological Park that re-

STEVE MASLOWSKI

***The future** looks dim for the shrike (right), which has declined in population by 95 percent over the last 22 years. Populations of the eastern meadowlark (facing page) have fallen by over 50 percent during the same period.*

Bye-Bye Blue Jay?

Annual breeding bird surveys over 22 years indicate downward trends in the populations of many North Carolina bird species. Especially hard-hit have been birds adapted to grasslands, old fields and deep forests. Habitat destruction here and in the rain forests of Central and South America has been blamed for many of these losses. Here's a selection of species most threatened, and their percentage changes.

Broadwinged hawk

-46%

Fairly common summer resident in mountains, but much less common eastward. Prefers extensive wooded habitats. Migrates in large flocks through Mexico and Central America to winter in South America.

Bobwhite quail

-52%

Found commonly throughout the state in grassy fields, hedgerows and open woods. Breeds in grassy habitat. Year-round, nonmigratory resident.

Eastern kingbird

-66%

Less common in the mountains, the kingbird is found mostly in the Piedmont and Coastal Plain, in scattered trees in open country. Winters in South America.

Blue jay

-38%

A common and conspicuous bird throughout the state. It nests in woodlands and open pine woods, and is a fixture at the backyard feeder. Permanent, year-round resident, but some populations are migratory within the state.

Northern mockingbird

-45%

Found abundantly throughout the state, although only in the lower elevations in the mountains. Likes woodland edges and hedgerows as well as residential areas. A permanent resident, essentially nonmigratory.

Brown thrasher

-35%

Common throughout the state, although much less common in winter than in summer. Favors overgrown fields, woodland edges and residential neighborhoods. Permanent resident, although some populations are migratory.

Common flicker

-47%

Common throughout the state. Prefers woodlands, especially open woods, groves and suburbs. Permanent resident, but migratory; large numbers often seen in migration on coast in fall.

Loggerhead shrike

-95%

An uncommon resident of the Piedmont and upper Coastal Plain, preferring open habitats with trees, telephone wires or fences for hunting perches. Permanent resident, but somewhat migratory; generally less numerous in summer than in winter.

Prairie warbler

-48%

A common summer resident in the eastern counties, becoming rarer inland toward the mountains. Prefers overgrown fields, maritime thickets and other places with saplings and shrubs. Winters mainly from Florida to Central America.

Common yellowthroat

-69%

A common bird of coastal fields, hedgerows and marshes, but infrequent in high-altitude regions of the mountains. Winters primarily in the Coastal Plain.

Cardinal

-28%

Very common throughout the state. Found in all kinds of wooded habitats, but preferring woodland edges and residential neighborhoods. Permanent, nonmigratory resident.

Rufous-sided towhee

-58%

Common throughout the state. Prefers thickets, overgrown fields, woodland edges and residential areas. A permanent resident, with some populations migratory.

Field sparrow

-33%

Common throughout the state, with populations increased in winter by migrants from farther north. Habitats preferred are woody fields and abandoned pastures. Year-round resident.

Eastern meadowlark

-53%

Common throughout the state. Adapted to grassy habitats such as meadows, pastures, large lawns and fields. Permanent resident, with populations increased in winter by incoming migrants.

House sparrow

-49%

An introduced species that is common throughout the state. Prefers habitats close to or adjoining human habitations. Permanent resident, essentially nonmigratory, especially in cities, towns and farmlands.

cently released a report confirming the decreases of migratory birds. "We've found widescale bird declines that are correlated with tropical deforestation. We don't think that these declines will lead to extinctions, but a lot depends on what happens to these tropical rain forests." What is especially troubling to these scientists is that many of these declines have come abruptly, over the last decade, after years of stable or increasing populations.

The data analyzed by Droege and his associates for their report were derived from the North American Breeding Bird Survey, an annual spring survey that began on the East Coast in 1966 and is sponsored jointly by the Fish and Wildlife Service and the Canadian Wildlife Service. Its purpose is to estimate population trends of birds that nest in North America north of Mexico. Each state is divided into sectors traversed by several routes of 25 miles each. In late May and June, when the birds are singing and identification is easier, volunteers travel by car along pre-established routes and make 50 stops a half mile apart, beginning a half hour before sunrise. At each stop they pause for three minutes to listen and watch for birds. Each bird they hear or see is noted on a list, and the marked lists are sent to the Patuxent Wildlife Research Center in Laurel, Maryland, where annual trends are tallied on about 370 common species of North American birds.

The Breeding Bird Survey data are not totally accurate for all birds, says Harry LeGrand, the North Carolina survey coordinator and the zoologist for the N.C. Natural Heritage Program. "For one thing, there are too few routes in North Carolina. We have only 32 routes, of which an average of 25 to 27 are run each year. Some routes miss major areas—for example, there are no routes through the Sandhills." Since the survey begins and ends fairly early in the day, moreover, it does not provide a good accounting for owls, which are nocturnal, or raptors, which soar on heat thermals that only begin to rise at mid-morning, just about the time the surveyors are ending their work. The data are most useful for wide-ranging and relatively common species such as cardinals, towhees, indigo buntings and bobwhite quail.

Yet, though flawed, the survey still is the only quantitative source of information on regional changes in the breeding bird population over the past 22 years. Analyses of these surveys have shown that the ailing North Carolina populations seem to be coming from several distinct habitats.

• **Birds of grasslands and old fields.** Many birds adapted to grassy areas and old fields have been especially hard hit. Meadowlarks and shrikes, species that forage among grasses, have experienced deep cuts, with shrike populations declining over 95 percent in 22 years, the highest shrike loss in the country. Some of the declines in these birds may be a result of changes in the mowing cycles, says Chandler Robbins, a co-author of the Breeding Bird Survey report and one of the nation's leading ornithologists. "Lots of fields are being mowed earlier than they were before," he says. "This shortens the

STEVE MASLOWSKI

STEVE MASLOWSKI

***Surveys show that** birds from grassy and old-field habitats are showing significant population declines. The rufous-sided towhee (above) has lost 57.6 percent of its North Carolina population since 1966. It favors old-field habitats which have been in short supply in recent years. At left, the bluejay's decline (-37.9 percent) mystifies ornithologists.*

WILLIAM J. WEBER

KEN TAYLOR

***Changing conditions** have enabled some birds to thrive. The ruby-throated hummingbird (above) has increased by 72 percent since 1966, while the bluebird (+369 percent) has made spectacular gains. The bluebird has benefitted from several decades of house building by concerned bird lovers.*

time the birds have to raise their young. Timing is critical because an early mowing may catch the young birds before they're able to fly."

Old-field bird populations are also plunging. Old-field habitat is abandoned cropland that develops through many stages of natural succession from grasses to pine forest to oak-hickory forest. Tar Heel sportsmen are familiar with the scarcity of bobwhite quail, but other birds adapted to old-field successional stages are down as well—field sparrows, towhees, prairie warblers and yellowthroats have experienced significant losses. The reasons are clear to LeGrand. "When you drive around the Piedmont today, you don't see many old abandoned fields," he says. "You may see cropland, but birds don't like that. Or you may see pine forests." Old fields are now sprouting shopping centers and residential villages. As a result, the birds are facing diminishing breeding habitat.

• **Backyard birds.** Harry LeGrand is puzzled by other birds that are faring poorly according to the Breeding Bird Survey data. Backyard birds such as the cardinal, mockingbird, blue jay, house sparrow and other urban-suburban birds have fallen in North Carolina, although robins have increased. "When you clear a forest and put in houses and yards, as we've been doing increasingly in North Carolina, you should have more mockingbirds as well as robins," he says. "I don't know what's going on with these birds." LeGrand hypothesizes that air pollution or fertilizer poisoning may be factors in the declines of these birds.

• **Neotropical birds.** Another group in trouble are the neotropical birds—migratory birds that breed in the forest interiors of North America and winter in the deep tropical rain forests of Central and South America. They include warblers, wood thrushes, red-eyed vireos and other birds. Researchers believe that responsibility for these losses lies primarily with the accelerating destruction of tropical rain forests.

The rapidity of deforestation in this region almost defies imagination. According to the Conservation Foundation, nearly 7 million acres of forest annually, or over 18,000 acres daily, are being leveled in tropics worldwide. Brazil's Atlantic forests are reported to have been reduced to 3 percent of their original size, while 77,000 square miles of its vast Amazon rain forests—an area nearly one and a half times the size of North Carolina—were cleared in 1987 alone. Most of the forest shrinkage has occurred because of population growth, slash-and-burn agriculture and cattle ranching. Already at least 12 percent of the resident bird species in the Amazon basin have been declared among "the living dead," according to one researcher. Now there's evidence that migratory birds from North America are also being affected.

Ornithologists and experienced bird watchers have long suspected that the accelerated harvesting of tropical forests in the 1980s was affecting neotropical birds.. "People I know and talk to, longtime birders in North Carolina, know wood thrushes are down, hooded warblers, Swainson's

Brown-headed cowbird

+301%

Found throughout the state, often flocked with blackbirds and starlings in winter. Lays eggs in other birds' nests, commonly in nests of warblers or vireos; preferred habitat is farmyards, especially nearby cattle. Year-round resident, but most populations migratory.

Ruby-throated hummingbird

+72%

Common throughout the state, but tiny size and quiet nature make it easily overlooked. Prefers woodlands and backyard gardens for nesting and foraging purposes. Migrates to rain forests of Central America in fall, crossing the Gulf of Mexico in a single night.

Pileated woodpecker

+309%

Uncommon in the Piedmont, the pileated is more numerous throughout the rest of the state. Prefers swamps and extensive forests for nesting and foraging. Permanent resident, essentially nonmigratory.

Purple martin

+173%

Locally common residents, except in the higher mountains, that once nested in natural tree cavities and woodpecker holes but now rely mostly on man-made nest houses. Prefers open country near nest houses; avoids woodlands. A summer resident, the martin winters in South America.

Fish crow

+340%

Common along the coast but presently extending its range into the Piedmont. It prefers habitats in tidal marshes and thickets, pine woods, and urban settings, generally leaving agricultural habitats to the American crow. A permanent resident in the tidewater region, it generally departs the inner parts of the state in winter.

American robin

+75%

Abundant throughout the state. Breeds in residential areas, and also (surprisingly) in spruce-fir forests, then moves in large numbers in late fall to feed on berries in wooded swamps and pocosins. Year-round resident in the state, but highly migratory, with most birds wintering in the Coastal Plain.

Blue-gray gnatcatcher

+300%

Common throughout the state, but not in mountains over 3,000 feet. Prefers bottomland hardwoods in all sections. Winters from southeastern North Carolina south to Central America.

Eastern bluebird

+369%

Common throughout the state. Likes open woodlands, orchards, farmyards and roadsides for nesting and foraging habitat. Permanent, year-round resident.

Carolina wren

+111%

Common throughout the state. Favors remote swamps and woodlands, as well as farmyards and residential areas. Nonmigratory, year-round resident.

Blue grosbeak

+93%

Common in Coastal Plain and Piedmont, less common in lower mountains. Prefers habitats such as hedgerows, thickets and abandoned fields. Winters from Mexico through Central America.

Yellow-throated vireo

+105%

Fairly common throughout the state, but absent in the higher mountains. Prefers mature deciduous woodlands for breeding and foraging. Winters from Mexico to Panama.

Pine warbler

+86%

Found nearly statewide, being common in most of the Coastal Plain and Piedmont, but uncommon in the lower mountains. Prefers pine woods, even in residential areas. Year-round resident in most areas, but generally less numerous in winter.

Hello Bluebird!

Some birds are doing well because human development activities create favorable conditions for nesting and foraging or because people build nest houses for them. Other birds are just plain adaptable. For others, your guess is as good as anyone's why they show a plus on the tally sheets.

warblers, Kentucky warblers," says LeGrand. "These are birds that are adapted to forest interiors."

To test the hypothesis that tropical deforestation was responsible for these suspected declines, Droege and his colleagues divided the results of the 22 annual breeding bird surveys from the eastern United States into two periods, 1966 – 1978 and 1978 – 1987, and then analyzed them separately. The results were a little like looking at the fading career of a one-time baseball slugger. Averaged over 14 years, the player's .287 batting average looks respectable. But when you know that he averaged .215 over the last three years, you know that his major league career is just about over.

"If you compare the early data to the later data," says Droege about their analysis, "the differences are dramatic. Birds that were increasing are now rapidly declining."

The North Carolina data were less dramatic. Averaged over 22 years, the breeding bird surveys showed that the state's neotropical migrants were experiencing no significant population declines. Most species were stabilized if not actually increasing. And when *Wildlife In North Carolina* asked the Office of Migratory Bird Management in Laurel, Maryland, to average the surveys over the past decade, the results were still mixed. Some neotropical migrants showed clear signs of attrition. Yellow-throated warblers, for instance, increased 130 percent from 1966 to 1987, but were falling 22.6 percent from 1978 to 1988. Wood thrushes showed a modest 15.3 percent increase over 22 years, but from 1978 to 1988 they were declining 32.5 percent. Yet, more than half of the state's neotropical migrants seemed to be doing all right.

These results are only temporary, according to Droege. "Evidently, the breeding cover in North Carolina is still good for the time being, yet ultimately tropical deforestation will catch up with these birds because we've demonstrated that it's not the breeding habitat that's the limiting factor (in the case of neotropical bird declines), it's the winter habitat. Eventually the losses of this habitat will lead to a negative trend in North Carolina's populations."

To be sure, some species are doing better than they were 20 years ago. The populations of bluebirds (+369 percent) and purple martins (+173 percent) in particular have soared in response to two decades of house building by bird lovers. Other birds are doing better because they seem to be more adaptable than most, according to LeGrand. Pileated woodpeckers (+309 percent), fish crows (+340 percent) and Carolina wrens (+111 percent) may have successfully adapted to changes in their habitat by exploiting new habitats. Still other birds are increasing because development activities are creating more habitat for them. American robins (+74.9 percent) may be thriving on all the new residential habitats they have. ("But why are mockingbirds and cardinals declining, since they like the same habitat?" wonders LeGrand.)

Another bird thriving because of increased development is the cowbird, and that worries LeGrand. The cowbird is a parasitic bird that lays its eggs in the nests of other birds. It is increasing because it is a bird of the "edge" — the place where two habitats meet, in this case the ecotone between cleared land and forest land. As development opens more forests, more edge is created and more habitat for cowbirds.

Droege and his associates say that they can't predict whether the declines they have noted will persist over the long term, but in the short term continuing losses are likely. Birds of North Carolina's grasslands and old fields will continue declining because these habitats will be even scarcer in coming years. As for the neotropical birds, certainly the halting or even slowing of tropical deforestation would help these populations, yet few observers predict this happening soon — or ever. "More and more tropical rain forests will be cleared in the future and I don't see it stopping," says Harry LeGrand. "Not only do neotropical birds have to face the hazards of distant migration, but they're experiencing habitat loss here as well as there."

Indeed, Droege and LeGrand both agree that deforestation in North America, as well as South America, is putting a double whammy on neotropical birds. The fragmentation of forest lands up and down the East Coast, including North Carolina, squeezes migratory forest birds hard. For nearly 100 years, woodland habitat actually increased for birds along the East Coast as farms were abandoned and reverted to forest. But now as development has increased, forest growth has waned and, what's

Observers Needed For Bird Survey

North Carolina needs a few more experienced birders to run additional routes for the North American Breeding Bird Survey each June. State and federal representatives say that the state is lagging behind most of its neighbors.

"North Carolina is undersampled," says Sam Droege, U.S. Fish and Wildlife Service biologist from Laurel, Maryland, who is the national coordinator of the Breeding Bird Survey. "The state doesn't have the density of observers that you really need."

Harry LeGrand, the North Carolina coordinator for the Breeding Bird Survey, agrees. "A highly populated state with a lot of birders, like Maryland or Massachusetts, may run six to 10 routes per block. (Each state is divided into square blocks one degree of latitude tall and one degree of longitude wide.) We've traditionally had only two routes per block because we've just not had enough birders. But I'd like to increase that number."

The more routes that are run, the more accurate the information and the more useful the survey. To run enough routes, Florida, Louisiana and Idaho pay their volunteers a modest gratuity — $20 a day is usual. These states have had no difficulty getting volunteers, say Droege.

A volunteer observer should be knowledgeable about birds, their songs and calls, and have excellent hearing. (Over 75 percent of the birds tallied on a survey route will be heard, either singing or calling, but not seen.) For more information about becoming an observer for the North American Breeding Bird Survey, write Harry LeGrand, Breeding Bird Survey Coordinator, Natural Heritage Program, Division of Parks and Recreation, Raleigh, NC 27611, or call him at (919) 733-7701.

KEN TAYLOR

TED DOSSETT

***Habitat losses** a continent away may be hurting neotropical migrants such as warblers and wood thrushes. Scientists have found that the destruction of rain forests in Central and South America is playing a major role in the decline of these species. Meanwhile, in North Carolina, suburban developments (left) and highway construction (above) fragment forests, putting more pressure on neotropical birds.*

worse, many existing forests have been fragmented. The effects have been grave on birds of the forest interiors. LeGrand offers a hypothetical example of a 250-acre tract of forest carved into 20-acre grids by power lines and new highways. The intact forestland might have originally supported 25 ovenbirds, but none of the smaller islands may offer enough habitat for even a single ovenbird.

There's no doubt that the decreasing number of old fields and grasslands in North Carolina are hurting birds adapted to those habitats. The role of deforestation here and throughout eastern North America on the declines of neotropical birds is more controversial. "This is a really complex problem," says Chandler Robbins about interpreting the results of the breeding bird surveys. "We can show what's happening, but almost always there are multiple causes so it's very difficult to say right off which ones are having the greatest effect. There are things happening here and things happening on the wintering grounds. They may be completely different, yet they are all having their impact."

The plight of our songbirds may only be symptomatic of a truth that is becoming increasingly self-evident — the world is shrinking and political boundaries no longer contain the consequences of a nation's environmental policies. Whether it's a nuclear disaster of the scale of Chernobyl or the deforestation of entire tropical ecosystems, the repercussions ripple out in all directions. As always, our wildlife are among the first to feel them. ⊠

RABBITS ON LINE

Wildlife biologists are tracking cottontail rabbits using sophisticated computers and telemetry to learn what they do—and, more important, what might be causing their long-term decline.

by Edward Lunk

SHARON LUNK

I found my watch beneath my parka sleeve and switched on the flashlight—it was 3:30 a.m. The light momentarily caught the billows of vapor enveloping me from my breath. Overhead, in the moonless January sky, Orion was slipping behind the faint silhouette of the distant treeline.

Except for the steady hiss in my headphones, the only sound came from ice crystals in the red soil that crunched underfoot. Again I lifted the antenna into the air. The pulsing of a transmitter chirped faintly over the background hiss. Searching the distant shadows of woodland and brush for a louder signal, I slowly arced the directional antenna across the horizon. The signal grew shrill as the antenna pointed in the precise direction of the unseen radio-collared cottontail somewhere in the darkness.

I took a compass reading on the loudest signal under the glow of the flashlight. With fingers growing stiff in the cold I keyed the azimuth into my handheld computer. The resulting line drawn by the computer across its tiny screen intersected with the two previous azimuths I had taken a few minutes earlier from the back edge of the field and the bend in the farm road. I had a good fix. On a hunch, I reached for the spotlight in the truck and switched it on. A brilliant scepter of light played across the dense vines and grass along the edge of the field. Glowing eyes returned the light. The rabbit paused briefly, chewing on a blade of grass, then disappeared into the tangle.

This kind of scenario is becoming more and more common these days. The modern naturalist must have more than a keen eye, a

LLOYD B. HILL

knowledge of woods lore and a love of the outdoors. Today's field biologist must also be familiar with a range of modern, high-tech and computer-aided tools and techniques. Increasingly, such equipment is being used in sophisticated wildlife research to help yield valuable information that would be difficult or impossible to obtain in conventional ways.

This equipment has proven particularly useful in studying the causes of the long-term decline in the population of cottontail rabbits in North Carolina and the rest of the Southeast, and it was that study that put me in a frozen field on a winter's night.

As a research assistant with the Department of Forestry at N.C. State University, I am part of a cooperative effort between the University and the N.C. Wildlife Resources Commission to evaluate cottontail rabbit habitat and, at the same time, to try to refine the ability of biologists to make better recommendations for rabbit management. Using computers and other high-tech equipment, we hope to learn how rabbits use different types of cover and to estimate how well the necessities of life are met by various kinds of habitat.

***Using sophisticated** telemetry (left), biologists can track radio-collared cottontails 24 hours a day without disturbing the rabbit's routine. The resulting information about their habits and range may give experts clues to the declining rabbit populations in North Carolina and elsewhere.*

MELISSA McGAW

EDWARD LUNK

***Some computers** are now so small and portable that the author (top) can use this model on field trips to record the whereabouts of rabbits. The rabbit is live-trapped and fitted with a small radio collar that gives off a signal. Though it may seem odd to see an antenna on a rabbit, it is not a hindrance.*

The first obstacle—one that has always been a problem for biologists—is finding rabbits at all times of the day and night. In years past, this was accomplished by live-trapping and tagging or careful observation from towers, methods that had their drawbacks. However, with modern radio-tracking equipment and computer mapping, biologists can track rabbits precisely 24-hours a day to determine what kinds of cover they use, and how far they are traveling. The rabbit becomes a "chirp" in a headset, tracked by a radio and charted by a computer.

To do all this, we catch rabbits in box traps and fit each with a miniature radio transmitter attached to a collar. The transmitter weighs just over an ounce and is powered by a tiny battery that can last six months or more. This transmitter sends a signal—a regular chirp—that can be heard with a specially designed radio receiver and a directional antenna. The antenna is aimed in the direction of the loudest signal, and a compass reading is taken. When lines are drawn on a map from several observation points indicated by compass direction, the intersection of the lines locates the rabbit. Thus, after a rabbit has been caught and fitted with a transmitter, future locations can be obtained without disrupting its daily routine. A computer—particularly a portable computer used in the field—makes the mapping task even easier because it can calculate hundreds of locations in a matter of seconds, a job that would have taken many hours by hand.

Before computers were used for this purpose, animal-location studies often generated stacks of hand-plotted maps, and it was very difficult to reduce all that paper to meaningful information. The computer not only permits rapid calculation of locations and allows further analysis, it can even estimate the size and shape of the area used by a rabbit as it goes about its day-to-day activities.

Every rabbit has a favored area or home range. Like a hill described by contour lines on a topographic map, locations pile up in a computer model of a home range, and the biologist can study this range on the screen of a laptop computer perched on the hood of a pickup in the field. Computer-drawn habitat maps help the biologist rapidly visualize and interpret relations between animal movements, their home range and features in the habitat.

The cottontail is traditionally thought to be a farm game species, but it inhabits a var-

iety of woodland, field and brush habitats. In our cooperative study, we are finding considerable individual variation in the kinds of vegetation used during day-to-day movements. One rabbit may spend most of its life within a pine plantation, while nearby, another will spend its time in a brushy field and a woodland edge. At this point, however, this new information may suggest more questions than answers. Are the differences in habitat use due to personal preference? Is the plantation rabbit living in poverty? Or are such areas, though very different in our eyes, really equal in terms of what they offer rabbits? We still have much to learn about what makes good habitat from a rabbit's point of view.

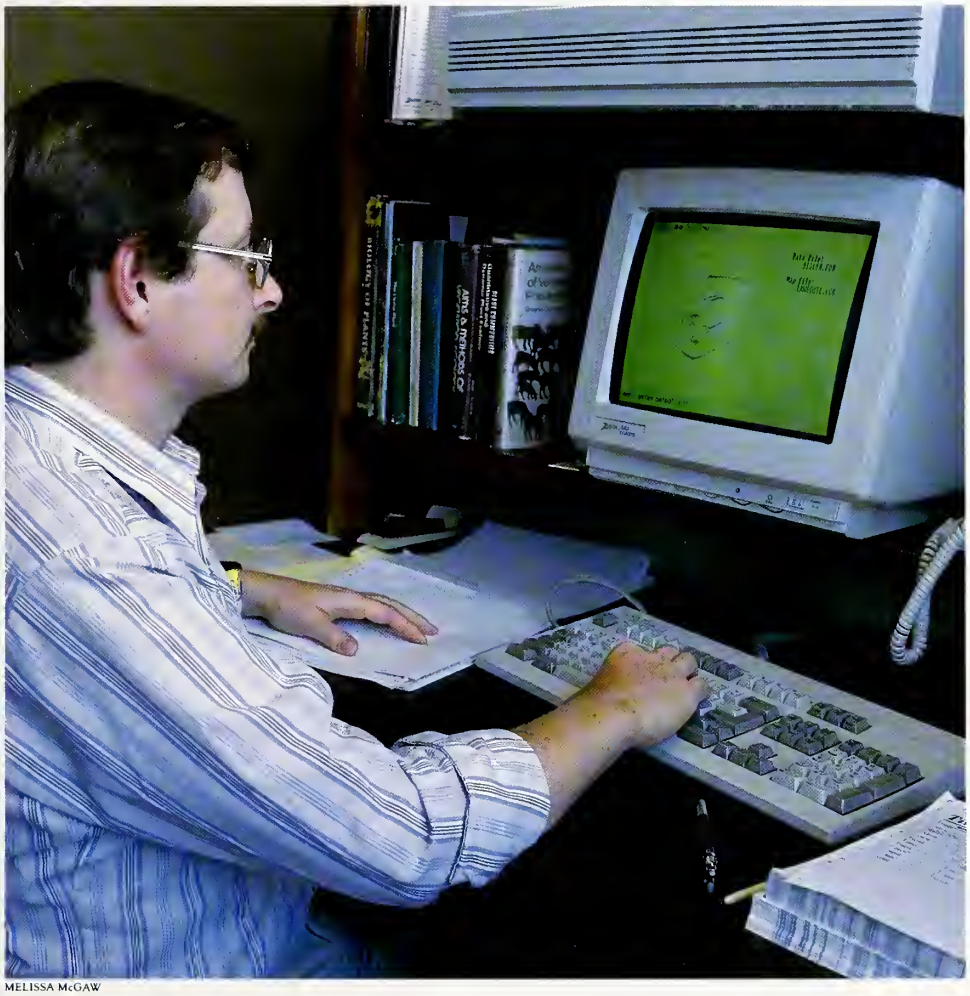
The morning after I located the rabbit in the edge of that icy field, I began to check the status of another collared rabbit that had not seemed to move during the previous night. I wanted to know if it was still alive. Like a super-sensory beagle with an antenna, I was able to home in on the collared rabbit. The pulse of the transmitter in the earphones got louder and louder as I closed in an ever-tightening circle through the woods. The signal, now so loud I could feel it pounding in my ears, told me that I must be within a few feet of the transmitter. I turned down the volume, and figured I must be looking right at it, but I couldn't pick it out against the brown leaves. Why didn't it run? Was I about to find an empty collar, dropped after its host had been eaten by a hungry owl? Then I spotted the rabbit beside a large rock, crouching low in the litter. It was in plain sight, but was relying on its coloration and stillness to hide it from eyes that didn't already know its whereabouts. I took one more step and the rabbit jumped out of the dried leaves and zigzagged across the opening. Yes, rabbit 1172 was still alive.

Though radio-collared animals can be located periodically using a directional antenna, there's another piece of gear that can help the biologist determine what it is doing around the clock. An automated activity monitor makes a continuous record of how much a rabbit moves around, recording changes in its radio signal as the animal changes its orientation to the monitor. It's like having a long-playing album of rabbit habits, a symphony of cottontail whereabouts complete from rest stops to hops.

This continuous record can be linked by computer radio-location data to show not only in what kind of cover an unseen animal is hiding, but also pretty much what it's doing. We may see, for example, increasing activity as dusk approaches, and a "jog" where a resting rabbit was disturbed and fled from an approaching predator or even a biologist. Because rabbits move around mostly at night, this kind of information is difficult to get any other way. We have learned that rabbits begin moving about an hour before dusk, and that their period of greatest activity occurs after dark up to about an hour before dawn the following morning. Often, rabbits will have a period of reduced movement around midnight, and their daylight hours are spent mostly resting or hiding. We have also found that these periods of activity and rest roughly coincide on different areas. Even so, the level of activity may vary quite a bit from one area to another, possibly because of the different kinds of cover available.

With wildlife researchers adding modern computer-age gadgetry to their bag of scientific tools, information is now available that was nearly impossible to obtain before. But while computers and other high-tech gear are helping unravel the intricacies of a cottontail's relation to its habitat, the pursuit of usable information is turning out to be much more complicated than expected, and our understanding is still quite rudimentary.

High-tech instruments help make new kinds of field techniques possible, but gaining better understanding of wildlife still requires painstaking observations and study by modern naturalists, just as it always has.



MELISSA McGAW

Back in the lab, *information gathered in the field gives the author an on-screen profile of each rabbit's range, and can also show exactly where the rabbit has traveled within that range. It's even possible to determine where the rabbit has stopped to rest.*

"FOR THE BENEFIT AND
ENJOYMENT OF THE PEOPLE"
YELLOWSTONE
NATIONAL
PARK
CREATED BY
ACT OF CONGRESS
MARCH 1,1872

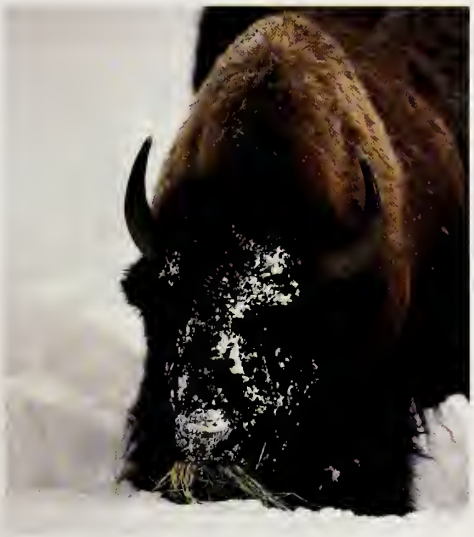
Yellowstone Blues

The dilemma over bison and elk migrations in the nation's first national park illustrates an incredibly complicated problem facing wildlife managers everywhere. How do you manage people?

by Chris Madson

You may wonder why an article on the problems of managing large animals more than half a continent away is appearing in Wildlife In North Carolina, *especially since we usually concentrate on local themes. After all, there are no elk and bison in our state, although ironically both once lived here. And yet, the problems facing Yellowstone National Park are sadly typical of those facing wildlife managers everywhere, and they are sometimes compounded by abbreviated, emotional reports in the mass media that lead to poor public understanding.*

Before you decide what you think is right for Yellowstone, read this account by Chris Madson who is editor of Wyoming Wildlife. *It is reprinted courtesy of* Outdoors Unlimited *from the May 1989 issue.*



LuRAY PARKER

***Bison pass** through the stone arch that marks the original north entrance to Yellowstone National Park, apparently following old migration routes to earlier traditional wintering grounds around Gardiner outside the park. In severe winters, forage is not easy to find, especially when herds outgrow their range. Yellowstone's burgeoning bison and elk populations threaten to outstrip the range, and they pose a classic management problem, one familiar to wildlife biologists virtually everywhere.*

If the stakes weren't so high, last year's business in Yellowstone National Park would be almost as entertaining as a Laurel and Hardy film. The Park Service spent most of the summer of 1988 stomping around in a blinding pall of smoke, one foot in the water bucket, the other tangled in a length of fire hose, while several senators took turns hammering them on the backside with a length of two-by-four. Superintendent Robert Barbee and crew freed themselves of the worst part of the fire controversy by Christmas, brushed the ash off their uniforms, pulled themselves back together with some effort at dignity—and walked right into a rake handle, the annual migration of north Yellowstone's elk and bison.

The stage for last winter's difficulties was set in the mid-1960s. The Park Service had been intensively managing bison and elk on the north side of the park for decades, breeding, trapping and transplanting, and occasionally shooting elk to limit grazing pressure on the limited winter range in the Lamar and Yellowstone River valleys. Elk reduction in the 1960s ran into a firestorm of public opposition, however, and the Park Service was forced to reassess its entire approach to ungulate (hoofed mammal) management in Yellowstone. As interest in ecology grew, the Park Service shifted from its traditional role as classic wildlife managers to a new approach called natural regulation. Service biologists and administrators felt they had evidence that elk and bison numbers in the northern part of the park would be regulated by available forage.

Unfortunately, there is no way to cork the Yellowstone valley. As elk and bison populations grew, more and more animals began moving along the river toward the north entrance of the park. Different observers had different ideas about the reasons behind this migration. The Park Service was inclined to explain it as a reaction to increasing social pressure, not a lack of food. Other technicians attribute it to the deteriorating condition of winter range in the park.

Whatever the reason, large numbers of elk routinely moved out of the park into the Yellowstone River Valley below Gardiner, Montana, a narrow valley occupied by private ranchers just north of the park. The ranchers were concerned about the influx of the elk for two reasons: the possibility of damage to stores of hay and, far more important, the chance of introducing brucellosis into herds of cattle. Brucellosis, a bacterial disease causing females to abort their young, was probably introduced into North American ungulates by domestic animals brought from Europe. Western stockgrowers have moved heaven and earth to eradicate it in domestic herds, in order to gain the economically valuable designation as a brucellosis-free state. Until recently, no one had demonstrated cattle could catch brucellosis from wild ungulates (research published in the last year indicate it may be possible), but ranchers didn't want to take the chance.

In response to landowner concern and hunter interest, the Montana Department of Fish, Wildlife and Parks established an elk hunt near the north border of the park. This hunt is actually little more than a firing line, but it has two obvious advantages—it trims

LuRAY PARKER

the herd, and it doesn't cost the department a lot of money.

The bison have taken a little longer to find their way out of the park, but, in the last five years, they've shown up in the Yellowstone River Valley and at West Yellowstone. The bison migration down the Yellowstone River is facilitated by the Mammoth-to-Cooke City highway, which is the only road in the park plowed clear all winter. Many of the park's bison are also infected with brucellosis and worry ranchers as a result. Fish, Wildlife and Park employees have occasionally shot problem bison in the valley. Between 1974 and 1984, 13 animals were killed. But many bison moved out of the park and lived to spend succeeding summers back on the upper Lamar River inside the park. What had probably always been a traditional migration pattern was re-established. In the winter of 1984-85, state

***Elk populations** have also expanded greatly in the park, threatening long-term damage to limited winter range. The problem, however, is not a matter of having no solutions. It's choosing one that is not wasteful, offensive or economically threatening to someone, somewhere. Pure wildlife management is biologically sound and fairly simple until it becomes a social or economic issue, which it often does.*

employees killed 88 bison north of the park.

Responding to the increasing problem, the 1985 Montana legislature classified the bison as a game animal and directed the Department of Fish, Wildlife and Parks to open a season on bison slipping out of the park. The following winter, legally permitted hunters took 58 bison. In the mild winter of 1986-87, only a handful were taken. The winter of 1987-88 was also unusually mild, and there was no need for a major control effort.

The bison shoot had not gone unnoticed by animal rights activists. Cleveland Amory paid a visit to the park in the winter of 1987-88. With his characteristic flair, Amory suggested the bison be fenced, transplanted, fed, neutered—anything but shot. He struck an agreement with one local landowner, promising Fund for Animals would trap and transplant any bison coming out of the park if the landowner would close his land to bison hunters. When the landowner asked for Amory's help the next winter, he and FFA were conspicuously absent.

By fall 1988 the atmosphere surrounding ungulate management in Yellowstone was explosive. After three mild winters, the elk herd had mushroomed to 21,000, the Lamar valley bison herd numbered some 990 head and the Yellowstone fires had consumed as much as 30 percent of the winter range inside the park. Anti-hunting groups were perched in the Yellowstone River Valley below Gardiner like vultures. Another unusually mild winter might have defused the situation, but no one familiar with Murphy's Fundamental Laws of the Universe could really have expected that to happen. As it turned out, the north Yellowstone country got its normal snowfall last winter...and a little bit more. Elk and bison moved north early, abandoning high pastures that were parched from the summer's drought and scorched around the edges.

Hunters took 2,300 elk in the Gardiner area, twice the usual harvest. Bison hunters killed more than 550 of the 990 animals of the North Yellowstone herd, many of them in front of the cameras of news journalists. The response to the video record of the buffalo slaughter was predictable. The Park Service was inundated with calls and letters, and the Montana Fish and Game Commission soon found they were not immune to the opinions of outraged citizens in New York and Pennsylvania. The commission issued a position statement on March 3 stating in part that "the department does not intend to reduce animal numbers below the core herd level" and "the consequences of natural regulation policy now being experienced along the northern border of Yellowstone National Park are no longer acceptable. The Montana Fish and Game Commission therefore believes a fundamental assessment of the management of these migratory herds is required."

LuRAY PARKER

***Yellowstone's massive** fires are likely to have little adverse long-term effect on the park's wildlife, far less than recent drought. But another less well-known problem reveals the complicated nature of managing wildlife on limited acreage. In addition to destroying their own range, overpopulations of bison migrating outside the park could infect cattle with a bacterial disease.*

The fundamental reassessment is going forward today. At some point, administrators with the Park Service may finally be forced to take some of the responsibility for a management regime it has adopted unilaterally. In the meantime, the Montana department, the U.S. Forest Service and the Rocky Mountain Elk Foundation are reportedly investigating the purchase of easements or title on additional winter range in the Yellowstone River Valley.

If you are reading this epistle in sunny North Carolina, I admit that you may not be particularly moved. I pass it along, not because of its importance in Montana big game management, but because it seems to have some larger implications. Hunting is likely to take a beating as a result of the coverage of the bison killing last winter. Yet, in the long haul, there is probably no better way to handle the situation in the Yellowstone River Valley than to shoot bison and elk, raising the level of frustration for both hunters and non-hunters throughout the country.

The second, and more important, facet of the whole mess is what it says about the typical American's understanding of wildlife management issues. The Yellowstone situation is a classic lesson in the ecology of large ungulates. Conservation communicators have hammered on such parables for 50 years. As always, Aldo Leopold probably said it best in 1940: "I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades."

It sounds pretty simple when I read it. So why doesn't anybody understand? ⊠

CELEBRATION OF BRANT

When these small, swift geese arrive to winter in North Carolina near the limits of their southern range, they offer waterfowlers a chance at a special trophy.

written and photographed by Joel Arrington ©1989

Riding backwards in the bow of an outboard skiff through the cold blackness of a December dawn, you must trust that the operator will avoid collisions. If he runs up on a shoal so that you have to get out in waders and help push the boat off into deep water again, it's a harmless development to be expected in eastern Pamlico Sound, groundings being a condition of life for watermen and waterfowl hunters along the sandy southeastern shore of North America.

As we race again down a dark channel, a line of tiny island lights burns white and steady at the horizon while navigation markers slide by blinking red and green. The eastern sky has lightened to gray behind a bank of dark clouds just at the horizon. A box blind Edgar Dickens has built on a shoal within sight of Hatteras Inlet looms high and wide, bushed with pine trees and myrtle. You wonder how any self-respecting fowl could approach it, but as we motor up, a flock of several hundred Canada geese takes to flight from nearby. Their melodious honking gaily disturbs the dawn and echoes faintly in memory even now.

Brant here are accustomed to crabbers who ply these shallow waters every day, so our approach has not frightened the flock sitting on an exposed shoal south of us. We can hear them discussing our intrusion and barely make out their silhouettes nearly a half mile away. A swimming brant holds its neck at an angle into wind, with the head well forward of the breast, a posture that did not go unnoticed by old-time decoy makers.

Atlantic brant nest farther north than any bird in the world, according to some authorities, farther even than snow geese. They winter mostly in New York's Long Island Sound and in New Jersey's Barnegat Bay. Some venture to Chesapeake Bay, and just a few migrate as far as South Carolina. Here in eastern Pamlico Sound, near the southern terminus of brant wintering range in North

***Sunrise at Hatteras** Island brings the promise of flocks of brant plying December skies. Pamlico Sound is at the southernmost range for wintering brant. Each year, perhaps a couple of thousand brant winter in North Carolina. Atlantic brant are thought to breed farther north than any other bird species.*

America, perhaps only a thousand or so birds spend the winter.

While Dickens and Mike Bateman set the decoys, grouping Canada geese, brant and diving ducks, the sun bursts red and gold through the clouds, then ascends behind a dark bank so that sky and water are gray again. We have climbed into the blind and are sitting 8 feet above the still dark surface of Pamlico Sound, looking across the vast expanse of shallow water and slate skies, when a skiff buzzes down from the north and skirts the reef where the brant and some seagulls have been sitting.

"Get ready," Dickens says, crouching lower in the blind, "they might come."

The birds take flight, the brant forming a loose flock close to the water, calling "brrtt" and "cluct." Abreast in lines, they appear almost black except for white undersides. The lines undulate, giving rise to one of the old names for Atlantic brant, "wavy." With its relatively small size, short neck and rapid wing beat, the species is unmistakable. Frank Bellrose, in *Ducks, Geese and Swans of North America*, says it is the swiftest of all geese in flight, attaining speeds in excess of 60 mph. They certainly have no trouble passing the Hatteras-to-Ocracoke ferry which, if you just want to see some brant, is in winter one of the best observation platforms in the state. The Ocracoke-Cedar Island ferries are also good.

The birds mill and wheel, gain altitude, then appear to catch sight of our set. They come toward us, calling, strings of brant waving up and down while seagulls, too, fill the air around our blind.

The gulls are milling overhead and calling loudly, but we are fixed on the black waterfowl bearing down on us. We can see the white neck bars as the birds loom larger. "You call it," Dickens says, and I finger the safety, pick a bird, say "take 'em" and stand. My first shot drops a brant; the second is a clean miss. I hear Dickens shoot twice, mark my bird down and turn to see his two on the water. The brant make a big circle back to their resting shoal and pitch in.

I examine the brant when Dickens returns with them. Males and females are alike, both having short black bills, charcoal heads, necks and upper breasts. These adults have white markings on each side of the upper neck and the backs of their wings are dark brown. Breasts and belly of the Atlantic brant are white, distinguishing them from the black brant, a very similar bird of the Pacific coast rarely seen east of the Continental Divide.

The Canada geese which we had flushed at dawn by nine o'clock fail to return, but the season is out on them anyway. Only a few bufflehead fly by low to the water, their short little wings beating like a bee's. Somehow Dickens has misplaced his calls (they had fallen inside his waders, we learned later) and when we climb down from the blind to search around the pilings, the brant resting south of us begin to gabble, but they do not fly.

Within seconds of his return, however, another flock of brant comes out of the east and Dickens keeps his seat while I take my second bird, filling my daily limit.

Mike Bateman, who had helped us set up, then had run off on fishing business, returns and enters the blind to take his turn while Dickens motors off in the skiff to check his net.

In minutes a big flock of brant again sweeps over the decoys. Bateman fires twice and drops one.

For a few minutes, no waterfowl can be seen anywhere. We watch a single diving duck approach and then identify it as a hen scaup. She pitches into the decoys just as I stand to shoot. No amount of hooting and whistling can roust her, so we let her be. In minutes she is scratching behind her head, content as if sitting on a Canadian prairie pothole.

Then the resting brant again take flight. Some fly away up the sound, but a line swings over our blind. Bateman stands and neatly drops his second bird. Dickens, watching from a distance, returns in the skiff and we pick up the decoys.

Jerry Serie of the U.S. Fish and Wildlife Service's Office of Migratory Bird Management (OMBM), said his office monitors brant nesting success in the arctic as well as the winter food supply. States census eelgrass and sea lettuce and report to the federal bird management office. "We've tried to maintain a population of around 100,000 in the mid-winter survey," Serie said. The all-time high population reached 266,000 in 1961, but fell to the minimum of 42,000 in 1973.

All far-northern nesters are subject to extreme variation in nesting success, Serie pointed out, because weather plays such a critical role. Late spring snows can cover the ground, delaying reproduction until too late.

Taking aim, *a hunter tracks a flock of brant flying low over the decoys. Like all waterfowl species, brant populations this century have fluctuated as variations in weather have greatly influenced yearly breeding success.*

***Guide Edgar Dickens** retrieves a brace of brant from a spread of decoys near Hatteras Inlet. Although they are exceptionally fast fliers, brant are easy to decoy. Their diet of eelgrass and other aquatic vegetation makes them superb table fare.*

Hens reabsorb unlaid eggs when that occurs, conserving energy, but the percentage of young in that year's population drops drastically. Serie said his office wants to see at least 20 percent young, but in recent years young-of-year have comprised as low as 12 percent (1974) and as high as 66 percent (in 1973). One study showed egg loss of 27 percent to herring gulls and desertion and, when nests were not protected by water barriers, to arctic foxes. When nesting success and winter food supply decline, the OMBM may reduce the bag limit or close the hunting season altogether, a measure to which it resorted for a few years in the early 1970s. Brant recovered and by 1975 reproduction and food supply permitted a four-bird bag limit. From 1981 to 1983, it was reduced again to two, went back to four from 1984 through 1985, but it has remained at two since 1986.

Atlantic brant decreased alarmingly in the 1930s, due to widespread die-offs of their primary food, eelgrass. The species began to eat other plants, including sea lettuce, and in hard times began to graze to a minor degree on uplands. Eelgrass along the Atlantic coast recovered in the 1940s and Atlantic brant eventually climbed back to former abundance. Now a plentiful supply of eelgrass in Pamlico Sound provides food for the limited numbers of brant that migrate there.

A strictly vegetarian diet makes brant one of the very best waterfowl on the table. Birds I have eaten compare with any canvasback or redhead, any black duck or grain-fed mallard.

Earlier years were also times of great depression in brant populations. Scarcities have been reported at Monomoy, Massachusetts, between 1863 and 1909, and in other years in the decades before and after 1900. Bellrose quotes the journal of the Monomoy Brant Club in 1882: "We feel more and more every year that if things continue for a few years more and the birds grow fewer and fewer every year, in ten years there will not be birds enough to render Brant shooting a sport at all."

The first time I hunted brant was also at Hatteras, but in the late 1970s. On a bluebird day, Jim Carmichel and I sat in an unbushed box blind on the reef west of the island and watched for hours while a flock of brant rested and preened themselves on a shoal a few hundred yards south of us. Hunters and anglers who spend much time on Pamlico Sound try, but never get fully used to military jets, whose pilots train nearby, breaking the sound barrier. Without warning, a sonic boom jolted us off our benches and put the brant to flight. Regaining composure, Carmichel brapped on a mallard call, making a sound only roughly like a brant's peculiar cry, and the birds swung by our blind. We dropped four on the first pass and incredibly the birds flew away only a short distance, wheeled and came directly back. We took three more, not quite filling our limit, then waded out to pick up the birds. It was the only action we had all day.

As waterfowl go, brant are easy to decoy. A large stool helps, but there is no necessity for brant decoys. Canada goose, snow goose, or any kind of duck decoys will work well in sufficient numbers. Guides like Edgar Dickens tell me that daily hunting pressure will move brant, but they are not as sensitive as other geese. He strictly limits hunting from his blinds to increase chances of success.

Undomesticated, the Atlantic brant is a product of the coastal environment. As a species, it shuns fresh water, preferring big saltwater bays, and, unlike swans and other geese, has taken to grazing on domestic crops only to a minor extent, and only in extreme conditions, as during hard freezes. By contrast, the black brant can often be seen on Pacific coast golf courses. The Atlantic version, our ocean goose, resists civilization's seductive attractions and remains persistently a symbol of wildness.

NF 1703 BK

Pickerel Pleasures

Say what you will about hated "jacks," I'll take pickerel over bass most any time.

by Jim Simons
photography by Larry Ditto

I was retrieving my spinnerbait by a brushpile on a November afternoon when I felt a nip at the lure. Setting the hook, I felt a fish for just a second before the hook pulled loose. Immediately, I cast back to the same spot and hurriedly cranked the spinnerbait. This time the lure was welcomed with a solid yank. The fish pulled strongly, and made a wild leap forming an almost perfect circle as it wrapped its body into a bend so tight that its tail touched its head.

I knew even before the jump that the fish was a chain pickerel. The second strike was the tipoff. Pickerel are like that. Often, they will hit the same lure again with reckless abandon, as if daring you to hook them. Pickerel will also strike when they are already stuffed to the gills. I have opened more than one distended pickerel belly to find freshly swallowed fish. My bassing buddies say that pickerel do these things out of sheer stupidity, but I prefer to attribute it to a pugnacious nature. This same aggressiveness makes pickerel an exciting game fish.

Aggressiveness is a trademark of the pike family, and pickerel are members of this family, along with the larger and more famous muskellunge and northern pike. Two kinds of pickerel are native to North Carolina—the chain pickerel (*Esox niger*) and the redfin (*Esox americanus*).

The redfin pickerel is the smaller of the two, seldom reaching 12 inches long. Its slender green body has dark, vertical to diagonal markings on the sides. True to its name, the fins have a reddish tinge.

It is the larger chain pickerel that most often crosses lines with anglers. Chain pickerel have more aliases than Al Capone's bodyguard. Although their most common nickname in this area is jack, they are also known as jackfish, jack-pike, pike and some unmentionables (especially "snake" or "hammerhandle"). They often reach a length of 24 inches and weigh several pounds but the state record is 8 pounds, and the world record is 9 pounds, 6 ounces. A long, streamlined fish, they are usually green and tinged in gold. A broken chainlike pat-

***The handsome waters** of the east are the chain pickerel's home, especially the blackwater rivers and millponds of the Coastal Plain and lower Piedmont. Well-suited for a small boat and solitary angler, this tranquil backwater seems an unlikely spot for a predator as pugnacious as the pickerel.*

tern on their flanks gives them their name. The head, which is shaped like a small alligator's head, has a mouth full of sharp teeth.

While the pickerel's relatives, the musky and northern pike, are popular in their native ranges in the northern part of the nation, chain pickerel have never attained very high status among fishermen in North Carolina. This has always puzzled me, because everything that is exciting about catching musky and northern pike, except size, holds true for pickerel.

Even so, this lack of popularity can be a benefit. While the largemouth bass are under ever-increasing fishing pressure, good pickerel fishing in many of the same waters is still largely untapped. Chain pickerel appear to be holding their own, although there are no fisheries management programs for them. Only a few anglers go after pickerel on purpose, and most are caught by accident while largemouth or crappie fishing.

Perhaps the pickerel's main claim to fame is its aggressive, unpredictable nature. This makes for exciting strikes and memorable fights. Like other fish in the pike family, pickerel are notorious lure followers, and will often wait to strike right next to the boat. At other times, they will follow a lure to the boat, but turn away at the last second. An alert angler can usually coax these fish into striking.

I remember one occasion when a pickerel followed my lure to the boat and sort of milled around as if waiting to see what would happen next. My cousin tried an old pike trick of sticking his rod tip in the water and making a figure eight with the lure. The pickerel pounced on the lure and immediately went airborne. It was something to see because the pickerel jumped several times only 3 feet from the rod tip.

Another time, I hooked what surely would have been my biggest pickerel next to the boat. The fish was too big to "horse" to the net, but it couldn't get the leverage to make a run. Instead, it splashed frantically on the short line. The pickerel won that standoff, and soaked my wife and me on a cold March day.

Pickerel also like to play "possum" after being hooked and sometimes save their best fight for last. One day, my partner was hauling in what we thought was a small bass hooked on a plastic worm. The bass turned

***Few fish native** to the state attack an artificial lure more violently than the chain pickerel, a trait that endears it to a small, but avid, following of admirers. Once hooked, a big pickerel will sometimes conserve its energy until it sees the angler or boat. Then, look out.*

out to be about a 5-pound pickerel. At boatside, the huge fish took one look at us and made a surge, taking the worm with it. It pays to cautiously play a "small" fish in pickerel infested waters until you see what you've actually hooked.

When not playing "possum," a pickerel may try to jump wildly or bury itself in thick cover and pull the hook out of its surprisingly tender upper mouth membrane. Don't try to lip-land a pickerel unless you are the type who would stick your hand in a food processor. Use a landing net.

The pickerel's aggressiveness often results in vicious strikes, and they particularly like to slash at surface lures. On shallow running baits, an attack on the lure is often signaled by a wake homing in on the lure. Jack fishing is not for the faint hearted. Even with live bait, I have seen them hit a minnow so hard that they made the bobber pop the surface of the water.

Finding pickerel-inhabited waters should be relatively easy. Virtually all of the rivers and streams in eastern North Carolina harbor good populations. Pickerel especially seem to thrive in those old, shallow, stump-filled millponds found throughout the Coastal Plain.

Some Piedmont lakes also produce good pickerel fishing, particularly in the eastern Piedmont and Sandhills areas. John H. Kerr Reservoir on the Virginia border yields some very large pickerel each year, as does Lake Gaston next door. In fact, that 8-pound state record chain pickerel was caught in Lake Gaston. As you go farther west, pickerel fishing gets spotty, but a few streams and lakes have some decent populations.

Pickerel are almost always around some kind of cover, and are classically associated with weed beds. They also like fallen trees, stumps and rocks. In rivers, try fishing parallel to the deep edge of weed beds or in lily pads that are out of the main current. Most pickerel are caught in reservoirs during the spring and fall while shoreline fishing for bass. For some reason, few pickerel are caught during the dead of summer in the large reservoirs, although they are commonly caught throughout the summer in eastern rivers and shallow lakes. Regardless of where you fish, your best bet will be in 2- to 3-feet of water. During late fall and early spring, pickerel will congregate in shallow, weedy flats. Usually, only small pickerel are caught in extremely shallow water, regardless of how fishy it looks. Pickerel are not considered schooling fish, but it is possible to catch several within casting range of each other, especially around cover.

Your choice of lures is less important than where to use them. Pickerel are not picky. Larger ones will hit any bass lure, from topwater baits to bottom bumpers. Their teeth, though, can play havoc on expensive balsa plugs, and they tend to bite the tails off plastic worms. Even so, I do not believe that wire leaders are necessary, and they can even destroy the action of your line. I rarely get cut off, although I do re-tie the line frequently and remove any frayed line.

The main thing to remember about pickerel is that other fish are their main diet. Try flashy lures like silver spoons, spinners, spinnerbaits, and shiny plugs. For ages, a red and white striped spoon with a treble hook has been considered the ideal pickerel lure; however, such spoons must have gotten their reputation somewhere else because they stay snagged a lot in the shallow, stumpy North Carolina pickerel waters. Red and white will work, but I prefer red and white pork rind on a weedless Johnson Silver Minnow. The in-line spinners, like the Mepps Aglia, have caught tons of pickerel and were a longtime favorite of mine before spinnerbaits became so prevalent. These days, I think it's hard to beat a spinnerbait. If your nerves can stand topwater fishing, the skinny, floating-diving minnow imitations, such as the Rebel and Rapala, are good when darted on top.

A steady lure retrieve is often better than the stop-and-go retrieve often used for bass fishing. Pickerel are designed for quick ambush attacks, but are less adept at abrupt changes in direction, and are therefore more likely to miss an erratically retrieved lure. The speed of the retrieve should generally be rapid, except during the coldest part of winter when a slow steady retrieve works best. A pickerel's preference for fast-moving food is probably why so many strike a lure at the boat just as the angler is hurrying for another cast.

Minnows are the preferred live bait. Standard bass-size minnows 2- to 4-inches long work just fine. Underwater photography has shown that a pickerel will hit a large minnow sideways, using its sharp teeth to cripple it, then release its helpless prey to swallow it head-first. Keeping this in mind, it is better to let pickerel have the minnow for a few seconds before setting the hook.

The old technique of "skittering" is worth mentioning. Some of the earliest sportfishing tales in North Carolina give accounts of skittering a strip of fish belly or pork rind for chain pickerel using a long pole with a short line to skim a lure back and forth across the surface. This tactic produces some awesome strikes and allows presentation into otherwise inaccessible spots.

Your choice of tackle for jack fishing is determined more by the nature of the water than by the size of the fish. Most pickerel will weigh less than 2 pounds, so light spinning gear can provide great sport. Unfortunately, pickerel are usually in snag-filled water where pinpoint casting and heavier lines are needed; therefore, baitcasting gear is often a better choice.

***If the chain** pickerel were human, it would wear a leather jacket and carry a straight razor. With a mouth full of sharp teeth, and a disposition to match, it's a very effective predator and a fine gamefish that deserves more respect.*

For some reason, pickerel often bite when bass don't—especially in cold weather—and they have saved many a fishing trip when the bass got lockjaw. Indeed, pickerel can be caught all winter, and farther north, they are a favorite ice fishing quarry—the perfect fish for the diehard who refuses to put the rod away for winter. I caught my first nice chain pickerel on January 21 one year when the wind chill made me doubt my sanity. It was so cold that 10 minutes of fishing could have cured two months of cabin fever. A slow, steady retrieve of a yellow spinnerbait produced a nice 3 pounder, however. As cold as it was, the pickerel was not sluggish, and it stripped line from my bait casting reel twice before I could land it. For me, pickerel offer a second chance at catching something when bass don't bite. Because they also strike in cold weather, they give you a second season to fish. As if that weren't enough, they sometimes strike a lure more than once.

Now, if I could only convince some of the monster pickerel I've lost to give me a third chance. ⊠

Last Season Worst On Record

Quail Harvest Down In 1988-89

Written and Edited by Vic Venters

If you're a quail hunter and wondered why your bird hunting was so bad last year, you're not alone. The results from last year's Avid Hunter Survey of the 1988-89 season showed that quail hunters fared badly statewide. The average bag per hunting party per trip last year dropped almost 21 percent in the coastal region, almost 26 percent in the Piedmont and almost 15 percent in the mountain region. The drop in hunter harvest mirrored similar declines in the number of quail found and coveys flushed. Forty-five out of the 47 counties surveyed showed decreases in the number of coveys flushed.

The survey, which tracked the results of 140 avid quail hunters from 2,800 hunts, is used to monitor population trends as measured by hunter success. Judged by the results, last year was the worst quail hunting season since the survey began in 1984.

However, don't sell your guns and put your pointers out to pasture just yet. This year's rains offer the hope that quail reproduction may have improved this summer. "The state has had better weather conditions for quail to raise their broods this summer," said Terry Sharpe, the Commission's small-game project leader. "We've had regular rains over much of the state this year, where in previous years we've had drought conditions at least part of the summer." Sustained hot dry weather reduces the supply of insects that form a critical part of a young bird's diet. While Sharpe cautioned that it's too early to tell if the 1989-90 season will be better, there have been more hatchlings reported than in previous years.

However, Sharpe said that weather is only one of the factors that may influence quail populations. Changing agricultural practices and habitat losses have contributed to diminishing quail populations over the past several decades.

MIKE OVERTON

Pretty Point: *Unfortunately, quail-hunting scenes like this weren't too common last year. As measured by the Wildlife Commission's Avid Hunter Survey, last year's quail season was very poor. Biologists hope that this year's rains have eased the drought that may be responsible for part of the quail declines.*

Heavy Rains Reduce Salinity

Bass Spawn In Currituck Sound

All of the rain this year may have had some fishermen singing the blues, but Currituck Sound bass aren't complaining. Once considered one of America's premier largemouth bass fisheries, the sound has fallen on hard times this decade as salinity levels increased due to drought, thereby preventing successful fish reproduction. However, this year's heavy rainfall has allowed enough freshwater to enter the sound to permit bass and other game fish the opportunity to spawn.

Bass do not tolerate salinity above 10 percent very well, and in some parts of the sound, salinity had been measured as high as 28 percent in recent years. However, with this year's precipitation flooding the waterways that feed into the sound, saltwater levels have decreased to about 3 or 4 percent. "Salinity levels have dropped drastically and are as low as they've been in five years," said Pete Kornegay, the N.C. Wildlife Resources Commission's fisheries biologist for the region.

"Our fish samples this July showed very good evidence of young-of-the-year bass, which is a good indication of successful reproduction," he said, noting that bluegill, which are less tolerant of salt water than bass, are also reproducing in some areas of the sound. To speed recovery of the sound's bass fishery, the Wildlife Resources Commission also stocked 60,000 bass fingerlings in June.

Although the decreased salinity is good news for Currituck Sound, fishermen should not expect an immediate return to the days when 100 bass were caught per outing. Continued spawning success will be dependent on normal rainfall in the coming years, and pollution from increased development may limit the sound's productivity. A period of five to 10 years may be needed to reestablish a healthy bass fishery in the sound, Kornegay said. So keep your hooks sharp and your fingers crossed.

Deadline Is November 20

Nongame Research Projects Funded

For the third year, the N.C. Wildlife Resources Commission will be awarding small grants to individuals, organizations and agencies to provide funds for research, management and education efforts involving nongame or endangered wildlife.

The small grants program is sponsored by the Commission's Nongame and Endangered Wildlife Fund and the application period for the grants runs until Nov. 20. Funding will be awarded on a one-year basis and will be announced in April 1990.

"To date, we have funded 35 projects at a cost of $75,000," said Randall Wilson, head of the Division of Wildlife Management's nongame section. The program has been implemented to help generate information that contributes to the understanding, protection and management of North Carolina animals which are not game species. Funding for this program is provided entirely by the North Carolina Nongame Wildlife Tax Checkoff.

Trained By Wildlife Commission

Students Bag Hunter Safety Award

A team of junior high school students, trained in the N.C. Wildlife Resources Commission's hunter-safety program, has taken top honors in international hunter-safety competition in Canada.

After winning the overall competition for juniors in North Carolina, the Forbush Elementary School hunter-safety team from Yadkin County was named best overall in the North American Hunter Education Challenge.

In individual overall competition, Jason Petree and Marty Jones, both Forbush students from East Bend, placed second and third, respectively.

Also winning was North Davidson High School of Lexington, which placed first in the hunter-safety trail category at the North American competition after winning overall in the senior division in North Carolina's competition.

The Wildlife Resources Commission has trained more than 1,000 instructors across the state to teach the hunter-safety course. Currently, the course is voluntary, but beginning in 1991, first-time hunting license buyers must certify that they have completed the course. Hunters should also be aware that hunter-safety courses are now required to purchase licenses in certain states or Canadian provinces. Failure to be able to show proof of completing a hunter-education course may prohibit the purchase of hunting licenses in other states. Hunters planning a trip out of North Carolina should review the hunter-education requirements for their destination.

Field Notes

Season openings or closings this month:

Eastern gun deer season	Open through Jan. 1
Central bow and arrow deer season	Closes Nov. 4
Central muzzleloading deer season	Closes Nov. 11
Central gun deer season	Nov. 13–Jan. 1
Northwestern bow and arrow deer	Closes Nov. 11
Northwestern muzzleloading deer season	Nov. 13–18
Northwestern gun deer season	Nov. 20–Dec. 2
Western bow and arrow deer season (For Yancey County see *Regulations Digest*)	Closes Nov. 18
Western gun deer season	Nov. 20–Dec. 9
Bear: See *Regulations Digest*	
Wild Boar	Early season through Nov. 18
Gray squirrel	Open through Jan. 31
Fox squirrel (Only in 18 counties, see *Regulations Digest*)	Open through Dec. 30
Rabbit	Nov. 18–Feb. 28
Quail	Nov. 18–Feb. 28
Ruffed grouse	Open through Feb. 28
Raccoon & opossum (Western)	Open through Jan. 31
Raccoon & opossum (Eastern)	Open through Feb. 28
Rails, moorhens and gallinules	Closes Nov. 10
Woodcock	Nov. 18–Jan. 1
Common snipe	Nov. 14–Feb. 28
Mourning doves	Nov. 21–Nov. 25, Dec. 16–Jan. 13
Ducks, mergansers and coots	Nov. 23-25, Dec. 14 through Jan. 6
Sea ducks	Through Jan. 16
Snow geese	Nov. 3 through Jan. 31
Brant	Nov. 23–25, Dec. 14 through Jan. 20
Swan (by permit only)	Nov. 3 through Jan. 31

Check the *Regulations Digest* for information on season boundaries, bag limits and other regulations. Copies of waterfowl regulations are also available from license agents.

The 1990 North Carolina Wildlife Calendars Are Here!

***With such artwork** as James A. Brooks' "Upcountry Buck" featured above, the North Carolina Wildlife Calendar is sure to sell out again this year.*

The works of Sallie Middleton, Larry Barton, Ronald J. Louque, Bob Herr, Robert B. Dance, Mel Steele, C. Edward Swaim, Robert C. Flowers Jr., James A. Brooks and Duane Raver are featured in the 1990 Wildlife Calendar. Order yours today by returning the form below with your check or money order to 1990 Calendar, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, NC 27604-1188.

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CALO90

Unsold Prints To Be Destroyed

In what might be called "constructive destruction," the N.C. Wildlife Resources Commission has initiated a policy to destroy all unsold waterfowl and sportsman's prints six months after the expiration date of the accompanying stamps. This new policy should create greater potential for North Carolina prints which have been sold to increase in value.

Collectors wishing to purchase prints should contact art dealers immediately, as there are still a limited number of 1985, 1986, 1987, 1988 and 1989 North Carolina waterfowl and sportsman's stamp prints available. However, beginning December 31, all sportsman's prints and waterfowl prints from 1988 and prior years will no longer be available for purchase and will be destroyed.

All unsold 1989 waterfowl prints will be destroyed after December 31, 1990. All subsequent unsold prints and stamps will be destroyed six months after the expiration of the accompanying license stamp.

Once an edition has been destroyed, prints and stamps will only be available on the secondary market, a factor which usually considerably increases their values over issue prices.

"The North Carolina stamp and print program are among the most successful in the nation," said Sid Baynes, the chief of the Wildlife Commission's Division of Conservation Education. "We feel that this new policy will make our programs even better because it will provide collectors with a greater opportunity to purchase prints which will continue to grow in value as time passes."

Calendar Of Events

On several occasions, events in this calendar have been changed or canceled without notice. Readers should check the contact before traveling to an event. Listings for the calendar should be sent at least four months in advance.

Nov. 10 - 12
The 19th annual Waterfowl Festival at Easton on Maryland's Eastern Shore features art, decoys and exhibits. All proceeds are used to fund waterfowl conservation. For more information write Waterfowl Festival, P.O. Box 929, Easton, MD. 21601, or call (301) 822-4567.

Nov. 11
The N.C. Herpetological Society will hold its fall meeting at N.C. State University in Raleigh. All persons with an interest in reptiles or amphibians are welcome to attend. Contact N.C. Herp Society, N.C. Museum of Natural Sciences, P.O. Box 27647, Raleigh, N.C. 27611, or call (919) 733-7450.

Cast Us A Line...

If you'd like to share any unusual stories about wildlife or comment on the magazine or conservation issues, let's hear from you. Letters should be 150 words or less. We reserve the right to edit any correspondence. Please send to Letters Dept., *Wildlife In North Carolina*, 512 N. Salisbury St., Raleigh, N.C., 27611.

Poachers "Bear" Stiff Penalties

For poachers netted last year in Operation Smoky, "bearing the consequences" has taken on new meaning. Federal judges have ordered a record $132,875 in fines to the black bear poachers arrested a year ago during Operation Smoky in the North Carolina and Tennessee mountains. The fines are the largest amounts ever ordered in the nation in an investigation of its kind.

During the three-year undercover investigation, state and federal wildlife officers targeted the black market trade in bear parts that is threatening the black bear population in the Great Smoky Mountains National Park and U.S. Forest Service lands. The probe revealed a flourishing market in bear parts with a large number of bears killed during the closed season or in the national park. The parts sold included the head, hide, claws, meat and the gall bladder. These parts are prized for medicinal use in the Asian community in the United States and Asia.

Chan Woo Kim of Livonia, Mich., was the last of 28 defendants to be sentenced on bear-poaching charges. Federal District Judge John Voorhees sentenced Kim to a one-year suspended jail term, two years probation, and issued Kim a $20,150 fine. He was ordered to perform 100 hours of community service.

Kim was convicted in March on 34 counts of violating the Lacey Act, a federal law that prohibits the interstate trade of illegally taken wildlife. He purchased more than 100 black bear galls in a one-year period. The U.S. Attorney's office in Asheville prosecuted 28 defendants for violations that ranged from illegal hunting in the park to buying the gall bladders.

"I hope the heavy fines send a message to those who would try to profit from the illegal killing of black bears and that such killing will not be tolerated in the mountains of North Carolina," said Max Cogburn, assistant U.S. Attorney who prosecuted the cases.

The N.C. Wildlife Resources Commission, the U.S. Fish and Wildlife Service, the Tennessee Wildlife Department and the National Park Service funded the undercover investigation. "Operation Smoky began about four years ago when many reports began coming in to our officers about closed season hunting and the selling of bear parts," said Col. Harold Ragland, enforcement chief for the Commission. "These agencies worked together to bring an end to one of the largest black bear poaching and market-hunting operations in the nation's history. This is not the end of our enforcement efforts. We're still looking for violators."

—Angela Dorman Hill

Charting The Devil's Left Ear

The Devil's Left Ear And Other Marshy Places, *Charles "Buster" Humphreys, The Fig Leaf Press, 1132 Princeton Drive, Wilmington, N.C. 28403, $12.95*

As a kid growing up at the Cape Fear coast, I spent many a summer afternoon with friends exploring the area's salt marsh creeks in an old johnboat. At least once a summer, and sometimes more, we would find ourselves lost in the marshy maze with the tide going out faster than we could find our way out. The result was that we spent an unwanted seven or eight hours stuck in the mud, swatting at hordes of thirsty mosquitoes and calling our resting place names which cannot be repeated in a family magazine.

Had we possessed a copy of *The Devil's Left Ear And Other Marshy Places*, we'd have saved our parents a lot of worry and ourselves several quarts of blood. With this 32-page booklet, author Charles "Buster" Humphreys has produced a photographic "trail guide" to the salt marsh behind Topsail Beach south to Figure Eight Island. The core of this self-produced booklet is a series of 24 aerial color photographs that show the names and the locations of the various creeks, sloughs and waterways behind those islands. The photographs can be cross-referenced to a nautical chart that is also included. If you've ever spent a day lost in the marsh, you'll quickly realize the value of these photos. What appears to be an impenetrable labyrinth of marsh grass at sea level becomes a puzzle quickly solved using aerial photographs.

As the title of the booklet suggests, these waterways, which were usually named by the area's commercial fishermen, often sport colorful sobriquets. Fishermen, hunters or anyone who spends much time in the Topsail area salt marsh will find this booklet invaluable.

—Vic Venters

The Wildlife Endowment Fund Report

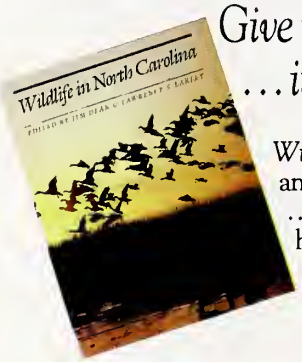
The Wildlife Endowment Fund is supported by the sale of lifetime licenses, lifetime subscriptions to *Wildlife in North Carolina*, and tax-deductible contributions. Only the annual interest from this fund is used for wildlife conservation, and the fund will play a key role in supporting wildlife programs in the future. Interest is earned through investments made by the State Treasurer's Office. For more information, write to the Wildlife Endowment Fund, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188.

Status on August 31, 1989

	Numbers Sold	Revenue Received
Lifetime Sportsman's License	47,597	$17,012,756.98
Lifetime Hunting License	523	141,637.13
Lifetime Fishing License	3,692	802,261.56
Lifetime Subscriptions to Wildlife in N.C.	1,688	228,810.28
Contributions	—	157,024.71
Fund Total	53,500	18,342,490.66
Total Interest Earned	$4,638,637.62	

Print Proceeds Fund Scholarship

Bodie Bass: *Prints of Duane Raver's painting of a Bodie Bass are still available. The original painting of this popular white bass/striped bass hybrid was created as a gift from the artist to outdoor writer Bodie McDowell of Greensboro, for whom the fish was named. Proceeds from the sale of this print (12 inches by 14 inches) will go to the Bodie McDowell Outdoor Writers Association of America Scholarship Fund. This fund presently provides about $20,000 annually in scholarships for college students working toward a career in outdoor education and conservation. To obtain a print, write The Bodie McDowell Fund, P.O. Box 564, Greensboro, N.C. 27402 or call (919) 375-4994.*



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(To order, see center insert pages 16-17.)

MELISSA McGAW

Red On Green

There's a certain seasonal quality in the sight of a brilliant male cardinal sitting in a holly, a not-so-subtle reminder that the holidays are just around the corner.

LITHOGRAPHY BY EDWARDS & BROUGHTON COMPANY, RALEIGH, NORTH CAROLINA

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WILDLIFE IN NORTH CAROLINA

DECEMBER 1989 75 CENTS

At Home With The Animals

by Jim Dean

Sitting in the the small cabin with firelight flickering on his face, Uncle Remus told his entranced young audience about a time long ago when humans and animals lived in harmony. They had even been able to talk with one another, and "ever' thing was satisfactual."

Archaeologists have found no Paleo Disneyland, but they do know that early man was able to domesticate some of the more useful animals that shared his habitat. Those animals that didn't immediately try to eat him were no doubt likely candidates, and horses, goats, cattle and dogs were among the first. Lost to history is the first occasion when a human scratched the ears of his half-wild hunting dog and received a grateful lick in return, but since then, mankind has routinely thrust pethood on many animals for mutual companionship. There is nothing wrong with this—up to a point.

LEONARD LEE RUE III

When I was a kid, my family had an astonishing number of pets at one time or another. There was the gray squirrel that would climb up and down the curtains until it became tired, then curl up in the pocket of my mother's robe and sleep while she went about her errands.

Once when I was sick, my pet chipmunk was allowed to share my room where it seemed to like to inspect caves I made in piles of blankets, or sit on my head where it could survey the playing field. At one point, it fell into the glass chimney of a table lamp, landing momentarily on the hot bulb and emerging like a round fired from a morter.

At various times, our house and yard were also home to several rabbits, a raccoon, flying squirrels, a young wood duck, a grackle named Max, a host of baby songbirds, and countless frogs, lizards, garter snakes and turtles. Indeed, I grew so fond of turtles that as soon as I could save a quarter, I would "rescue" a tiny turtle from the dozens in the dime store tank and peel off the pink enamel paint that was often applied to the shell.

These creatures, however, were all wild animals, and despite my good intentions, I seriously doubt that any of them were better off for my sentimental stewardship. You can make the same charge against many pet owners. Indeed, their choices are no longer confined to this continent. Today's preferred pets are exotic species from distant lands—birds, monkeys, huge snakes, large cats and many others. Some of these creatures are even endangered in the wild, and that status is further threatened by our demand for them. Most people who own such pets are gentle, well-meaning folks who would be the first to contribute to anyone collecting money to save whales, baby seals or gorillas—an ironic twist that underscores our present culture's abysmal misunderstanding of most things wild.

Not only is it illegal to make pets of wild animals, wildlife biologists have long argued that it is a mistake on several levels. Even when these animals are born and raised in captivity, and thus display a degree of tameness, they are still from wild stock. Some pose a danger to their owners. An apparently harmless white-tailed deer, wolf or cougar—even squirrel or raccoon—raised in captivity may suddenly yield to wild instincts and attack its kindly owner.

The second problem is that very few humans truly understand wild creatures or their needs. Indeed, our kindness often proves a liability. We see a baby bird or fawn on the ground in the spring, and wrongly assume that it is abandoned. We take it home and try to raise it where it often dies. Even if it lives to be released, its chances of survival were better before we interfered.

There's more at stake than safety for ourselves or the animals, however. Even if we are thoroughly convinced that our pet is completely tame, truly happy and better off under our stewardship, is it not a leap of faith to make such an assumption? Does it not make sense that wild animals, acclimated over millions of years to fending for themselves, deserve the same freedom that humans seek for themselves?

I think of the pet squirrel that hitched a ride in mother's pocket. When it had an opportunity to escape into the tall oaks in the yard, it readily chose the treetops, and no amount of coaxing or feeding would return that squirrel to its cage.

Perhaps it is time for us to assume a more enlightened role as stewards of the world's wildlife. If so, we should certainly reconsider the wisdom of keeping some of the pets we favor. If you love pets, get a dog, a cat or at least a thoroughly domesticated animal, and channel your love of wild animals into protecting their habitat and their right to live as they always have.

Soon, the woods will be full of young wildlife, and the temptation will be great to "help" these seemingly helpless creatures. If you do, your interference will almost always be harmful.

December, 1989
Volume 53, Number 12

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission, and is dedicated to the sound conservation of the State's wildlife and other interrelated natural resources and the environment we share with them.

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Cover *Did Jack Frost go wild, or has this high mountaintop forest passed through the glazing machine at the doughnut shop? More likely, a wet blizzard or freezing fog left this icy coating. Photography by Ken Taylor.*

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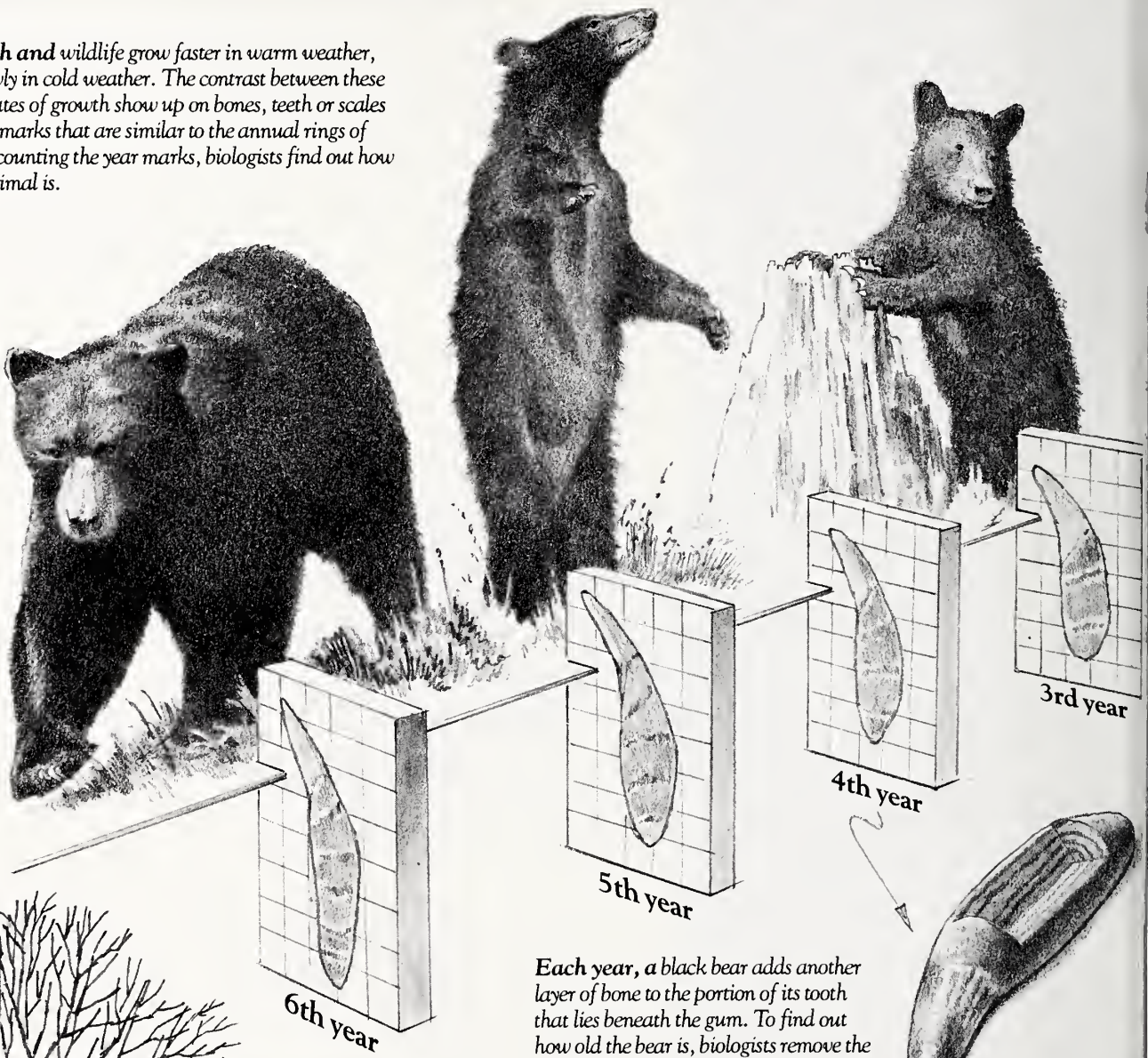
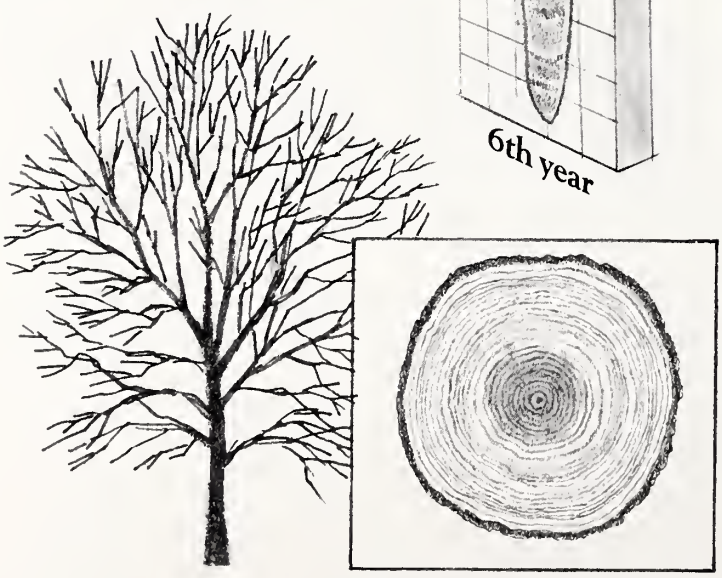
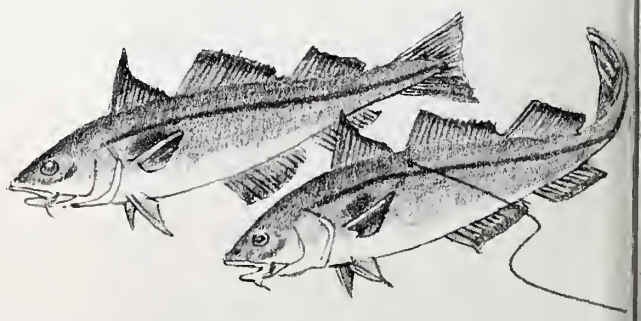
***Most fish and** wildlife grow faster in warm weather, more slowly in cold weather. The contrast between these annual rates of growth show up on bones, teeth or scales as visible marks that are similar to the annual rings of trees. By counting the year marks, biologists find out how old an animal is.*



***Each year, a** black bear adds another layer of bone to the portion of its tooth that lies beneath the gum. To find out how old the bear is, biologists remove the tooth, slice it down the long axis, and examine it under a microscope. A year's growth is recorded as alternate light and dark lines.*

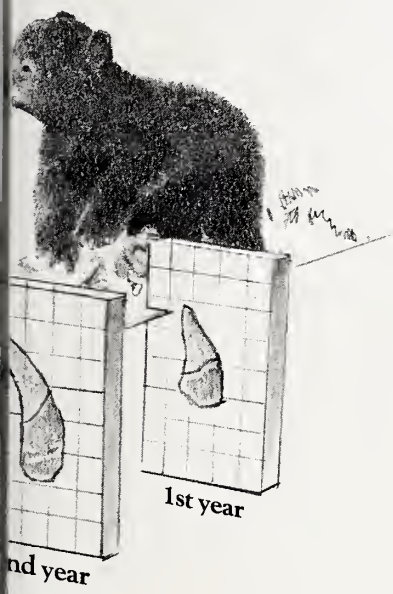


***Tree rings are** produced when the tree lays down wider cells in spring. In summer and fall, the cells grow narrower and darker. This contrast between light and dark produces visible rings that can be counted.*

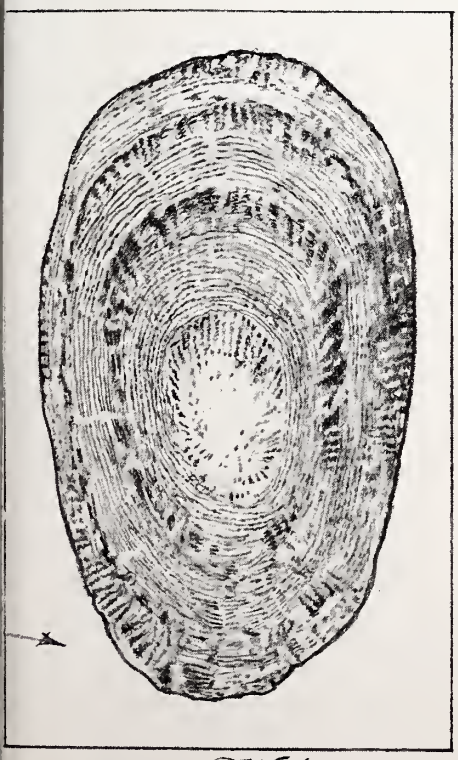


Counting the Years

written by Lawrence S. Earley/illustrated by David Williams



***Fish lay down** several circular ridges around the center of a single scale each year. These microscopic lines, called "circuli," are not evenly spaced. A group of closely spaced lines signals the end of a year's growth.*



Animals have birthdays, too, and wildlife biologists often want to know how many of them an animal has had. It's useful information. By gathering data on the ages of deer harvested by hunters every year, for example, biologists can estimate how many whitetail deer fall into different age classes. Information like this helps them control the size of the deer population by setting longer or shorter hunting seasons.

But how do they go about finding out how old animals are? There are a variety of ways. The size of an animal and the physical appearance of its body parts can sometimes be helpful in determining age. The appearance of a bird embryo, for example, can tell a biologist how long the bird has been developing, and the size of a hatched bird's wing feathers and the development of its inner organs are also give-aways. Among mammals, the growth and size of certain bones are indications of age, as is the animal's body weight. To find out how old a young deer is, biologists look at its premolars (baby teeth) because they emerge from the gums at regular intervals. For older deer, the tell-tale patterns of wear on the teeth in the lower jaw provide good estimates of age.

But size and appearance aren't infallible signs of age. Wouldn't it be helpful if you could count an animal's years the way botanists count tree rings? As is commonly known, a tree adds width to its trunk every year and if you look at the tree in cross section, after if has been felled, the record of its growth is recorded in visible rings. By counting the rings (made up of light-colored spring cells next to darker-colored winter cells), you can tell how old the tree was when it was cut.

Curiously, biologists have developed techniques of "aging" animals that are very similar to this. They've found that the passing years leave marks on the hard parts of some animals' bodies—their bones, scales or even teeth. By counting these marks, the biologists can get an accurate estimate of the animal's age.

For instance, black bears carry a record of annual growth on their teeth. Each year, a deposit of "cementum" (a layer of bone) is added to the part of the tooth that lies beneath the gum. A year's growth is recorded as alternate layers of light and dark cementum which can be seen through a microscope after the tooth is cut in cross section.

Biologists can tell how old fish are by looking at their scales. Viewed under a microscope, a scale taken from the middle of a fish's side reveals a series of very fine ridges in a circular pattern around the center of the scale. A series of light lines are put down in the summer, during the season of faster growth. In winter, as growth slows down, the lines clump together and look darker. A year is made up of the contrast between the dark lines and the light lines, very much like the rings of a tree.

Another way of telling a fish's age is by examining a bone in its ear, called an otolith. Otoliths also reveal a series of concentric bands around a center point. Under a microscope, the white bands reveal the fast growth of spring and summer, while the darker bands are the slow ones laid down in winter. By counting the light and dark bands as one year, a biologist can tell how old the fish is.

So how old are the birds at your feeder, the squirrel in that tree? Like some people, they won't tell you, but there are ways of finding out. ⊠

by Dennis Luszcz
photography by Larry Ditto

WILD WINGS SILENT WINGS

The Southeast can kiss the wild, migratory Canada goose goodbye unless present trends are reversed, and soon. But now, at least, we know what's causing the decline.

Canada geese are becoming a common sight all year long in much of North Carolina. Small groups of the birds can regularly be seen on many farm ponds, reservoirs and parks, and nesting near houses and along fairways. You even see them on golf courses. Many are city geese, accustomed to people, traffic and barking dogs. Some will even follow you around hoping for a handout.

In October, however, a different kind of Canada goose arrives on the scene. This Canada is smaller, leaner and more alert than its Carolina-bred cousins, and generally shuns the human activity associated with parks and golf courses. Its calls ring with excitement at returning to ancestral winter homes after a journey from breeding grounds in northern Canada. This goose is a product of wild places, and its call is a symbol of wildness. No popcorn for this guy.

While both geese look alike, their lifestyle has had a big influence on their respective behavior and, more important, on the future of their populations. The locally hatched birds or residents, as they are called, appear to be increasing at a steady rate within the state and elsewhere in the Atlantic Flyway. Best estimates place the resident goose flock in North Carolina at 10,000 to 15,000 birds. The migrant geese are another story, however, with their future somewhat in doubt. From the quarter of a million geese present after World War II, the migrant populations wintering in North Carolina at such places as Lake Mattamuskeet and Gaddy's Goose Pond now number less than 20,000. This trend is characteristic not only of North Carolina's migrant geese, but those of other southern states as well. Migrant Canadas have disappeared from Florida altogether, and only a remnant couple of thousand still winter in South Carolina.

Meanwhile, populations in more northern Atlantic Flyway States like Maryland and Delaware climbed to record numbers by the mid 1970s. In the last three years, migrant populations all over the Flyway have begun to decline, with the largest declines noted in the Chesapeake Bay states, and more moderate declines in the south. At the same time, the portion of the Flyway population wintering in

***Fresh from the** far north, a flock of wild, migratory Canada geese settles into a field to feed near Lake Mattamuskeet. In the late 1950s and '60s, more than 100,000 geese wintered at this Hyde County mecca, but only about 20,000 wild Canadas now winter in the entire state. Increasingly, migratory geese are choosing to winter in Maryland, Pennsylvania and New York.*

Pennsylvania, New Jersey and northward seems to be increasing.

To explain these changes, the theory of "short-stopping" has been promoted by wildlife managers. Briefly, the theory suggests that the shift in goose numbers from south to north is caused by changes in agricultural practices in the northern states. More corn grown in states such as Maryland, along with the advent of mechanical harvesting, has made more waste grain available to geese. Availability of corn allows geese to survive the cold winters, and they don't bother to fly as far south where hunting pressure is greater.

In recent years, a number of waterfowl biologists have begun to suspect that the problem is much more complex, and they have undertaken research efforts to provide an answer to the problem of declining southern geese. Their efforts culminated in 1984 in the initiation of the Atlantic Flyway Canada Goose Study. Eight flyway states from New York to South Carolina are participating in the study under the direction of Dr. Rich Malecki of the New York Cooperative Wildlife Research Unit at Cornell University. Under the study, 30,000 geese—over 5,000 in North Carolina alone—have been banded with individually coded yellow and black plastic neck collars during the fall and winter months. An additional 5,700 birds have been banded on the Canadian breeding areas. Several states, including North Carolina, have also begun banding resident geese during the summer months with white and black neck collars in order to shed more light on these portions of the Flyway goose populations.

Unlike the familiar aluminum leg bands which furnish information only when reported after the bird's death by hunters and others or their capture by wildlife managers, the neck collar system can

WILD WINGS SILENT WINGS

provide multiple sightings over the bird's lifetime. Since observations can be made by project personnel, they don't depend entirely on voluntary reports from the public, either. Only about one-third of the leg bands on birds harvested by hunters are ever reported.

Most North Carolinians living in goose country from Currituck to Winston-Salem have probably seen some of the yellow or white collars adorning the birds and wondered what they were telling us. They're telling us a lot. In fact, Canada goose management in the Atlantic Flyway will largely be based on data from this study for years to come. Offshoot studies such as those on resident geese will continue to fill in the gaps, but already the results of the primary research has given waterfowl biologists a new perspective on what affects wild Canada goose populations.

Three separate populations of geese are now known to be using North Carolina habitats: the residents and two groups of migrants, the Atlantic Population (AP) in the eastern part of the state and the Southern James Bay Population (SJB) wintering generally west of Interstate 95. As the name implies, the SJB breeds along the south shore of James Bay in Ontario. It also winters in and migrates through the neighboring Mississippi Flyway, which necessitates joint management with that flyway. The AP breeds in northern Quebec and in Newfoundland and Labrador. These birds migrate down the coast and through central New York and the Chesapeake Bay into North Carolina.

As suspected, the shortstopping theory does not entirely explain the observed population changes. Canada geese have a strong fidelity to specific wintering areas. If seen during the winter in a particular state they are, if still alive, likely to be observed the next winter in the same state. This is most pronounced in Maryland and other states in the Chesapeake area with over a 90 percent return rate over the last three years. North of the Chesapeake, the return rate is 71 percent while here in the south it is about 56 percent. Waterfowl biologists in North Carolina feel that the actual rate for this state may, in fact, be a little higher since most of the geese upon which the estimates were based were captured here in late winter, and the sample probably contained birds displaced from the north by cold weather. Geese arriving here in early fall probably harbor the strongest tradition of wintering here. They are, however, difficult to capture for banding during that time since they are less likely to be attracted to bait because of the milder temperatures.

Southern geese also are most likely to stop in a northern location, usually the Chesapeake region, during migration and prior to coming to the south. This, as would be expected, is more pronounced when temperatures remain warm at northern latitudes well into the fall. Not only does this increase the likelihood that a particular goose will delay migration until winter when the migratory urge may weaken and it "shortstops," but it also makes that goose vulnerable to hunting for more total days during the year.

A number of biologists have subscribed to another theory to explain shifts in goose populations, one called "differential survival." What this theory says is that if two goose populations share the same breeding grounds, the population with the shortest migration and least stops during migration will eventually become the most numerous, while the other population, as is the case of southern geese, will decline.

Since our migrant geese are exposed to more total hunting pressure than geese that winter in, say New York, the survival rate of our geese would be expected to be lower than that of New York geese. Survival rate, simply stated, is the proportion of a goose population that is alive at the beginning of a year, and is still alive at the beginning of the next year. For example, a population of 100 geese having a 70 percent survival rate, would have 70 birds still alive a year later.

It is estimated that a goose population needs at least a 76-percent survival rate for it to maintain its

***Although fewer** wild, migratory Canadas winter in the Southeast, populations of nonmigratory, resident Canadas have grown here. These relatively tame resident geese are often raised or fed by humans and have little instinct to migrate. In many areas they are welcomed, but in others they are considered pests and are certainly no completely satisfactory substitute for their wild cousins. Yellow neck bands like those on these Canadas (below) are superior to leg bands, and they have helped biologists learn more about the migratory habits of wild Canadas.*

numbers at the same level. The neck-band study estimated that the survival rate of southern geese between 1983 and 1985 was just under 60 percent. Since then, the survival rate has increased to almost 70 percent, probably the result of tightening of hunting regulations here and in the Chesapeake region since that time. Even now, we can see that our migrants would be expected to decline due to low survival alone, even without the further losses due to shortstopping. Further changes in regulations have since been made, however, particularly in Maryland and Delaware hunting seasons, which should benefit our geese. These include shorter seasons, lower bag limits, and shifting of hunting pressure away from the early part of the season when our geese would be expected to be in that area. All of these beneficial regulation changes were prompted by findings of the Atlantic Flyway Goose Study, and would have been impossible to sell to the other states otherwise.

Because of the steps already taken, North Caro-

WILD WINGS SILENT WINGS

A row of wild, *migratory Canada geese basks in the glow of a setting sun on Lake Mattamuskeet. With the success of recent banding studies, wildlife biologists have far better information to help them manage wild geese. If breeding conditions improve, there is now some hope that this scene will not become symbolic of a permanent twilight for wild Canadas.*

lina goose populations — as evidenced by annual aerial surveys in early January — have remained stable during the first three years of the last four-year period. Even taking into account a likely increase in resident goose numbers, migrant goose numbers in North Carolina did not decline during this time as steeply as they did before restrictive regulations, or even as much as a they did in the Chesapeake region during the same period. This is encouraging since regulating hunting mortality is the only tool that wildlife managers can use to influence goose numbers.

Besides shortstopping and differential mortality, a third factor has had an important impact on numbers of geese in a population — reproduction. Even with high survival and no losses to shortstopping, a goose population would eventually decline if young geese were not produced in sufficient numbers. With low survival and significant shortstopping losses, as in the case of North Carolina, reproductive effort has to be at a sustained high rate if the population has any chance to remain stable, much less grow. Here again survival plays a role. Recent research has discovered that the bulk of the production in a goose population — perhaps as much as 70 percent — comes from birds four years and older. Maryland waterfowl biologist, Larry Hindman, provides a good example of the role of survival on reproduction. Hindman compares two groups of geese each with 100 birds. If one group has a survival rate of 82 percent and the other 61 percent, about 40 geese would survive five years in the group with the higher survival rate. In the group with 61 percent survival, only ten birds would survive for five years. In other words, four times the number of experienced, successful breeders would be present in the group with the higher survival rate. Our southern goose populations are getting only a fraction of the young geese each year that some of the more lightly harvested populations elsewhere in the flyway are blessed with.

This situation is compounded by the poor nesting conditions that have prevailed on the Atlantic Population breeding areas over the last four years. Weather conditions, particularly late snowfalls, have kept nesting success to a minimum over the period, and few young have been added to the population. The situation this year is believed to be particularly bad with a complete nesting "bust" forecast for most areas. The result is that the regulation changes expected to remedy the declining populations may not be enough to do the job. For the next five years we cannot expect many new birds to enter the pool of older breeding geese.

You're probably asking if there is a future ahead for North Carolina's migrant goose populations? Were it not for the unprecedented string of poor reproductive years we are now experiencing, the answer might be an enthusiastic "Yes." Instead, a reserved "maybe" is more appropriate, and only if Mother Nature cooperates for the next several years. There's a desperate need to get the population up to a level where one or two bad nesting years will not threaten its survival.

You may also ask what we need to do, or keep doing, to maximize our chance for eventual success? First, hunting of the Southern James Bay birds in western North Carolina is out of the question for the time being because this segment probably does not exceed 2,000 birds. Efforts are also continuing to negotiate reductions of harvest on these birds in northern areas of both eastern flyways. For the Atlantic Population birds wintering in eastern North Carolina, harvest restrictions need to continue flyway-wide. Other times and places where southern geese may be present during migration must be identified and regulations modified to reduce their harvest. Here in North Carolina, there's a need to decide whether to continue to harvest geese in the short season now permitted in the east. Although the number of birds taken may be small, these birds may be critical to the future breeding population once breeding conditions improve.

Habitat improvement is another strategy that should be applied. Studies show that waterfowl are more productive if they return to the breeding grounds in good physical condition. The N.C. Wildlife Resources Commission is beginning the second year of a program developed to assure just that. Some 6,000 acres have been leased as field sanctuaries next to important waterfowl roosting areas statewide where geese, swans and ducks can feed undisturbed. Crops such as corn and wheat are purchased and left in the field to benefit waterfowl. During one survey last year, 25 percent of the statewide total of Canada geese was observed using these areas.

What about resident geese? Can't we just let them take the place of the migrants we used to depend on for our hunting? Although these birds can be expected to increase to a greater level and take up some of the slack, their potential may be more limited than that of migrants. First, for those of us who care about such things, they cannot be expected to replace migrant geese in a qualitative sense. That wildness that we look forward to every October has been dampened by the resident flock's familiarity with man. In a more practical sense, migrant populations have a much greater numerical potential because, for all intents and purposes, breeding habitat in the north is unlimited. Resident goose populations, wherever they occur, also cause serious nuisance problems, and for everyone that tolerates or even loves them there seems to be someone that doesn't. In most parts of the state, except for the now less developed East, resident geese have found numerous sanctuaries where hunting them for recreation or to control their numbers and nuisance potential is not a viable option.

Biologists now have the knowledge, as a result of the Atlantic Flyway Goose Study, to have at least a fair chance of assuring that the wild Canada goose will continue to migrate to our state from its breeding grounds in the far north. Success will require protection of the remaining breeding stock of these geese and, equally important, cooperation from nature. ⊠

A Tree For All Seasons

Holly's links with the holidays are old, perhaps older than most would guess, and many species bear little resemblance to the tree that wreathes our door.

by Doug Elliott

DOUG ELLIOTT

No one needs a description of holly this time of year. 'Tis the season to deck the halls (the malls and our city streets as well) with boughs of holly. Yet, not everyone knows that the connection between holly and the winter holiday season harkens back to pre-Christian times. Both the druids of western Europe and the ancient Romans considered holly's evergreen leaves and bright red berries as a symbol of life and hope during winter.

The ancient Roman Saturnalia festival began each year on December 17. This festival honored Saturn, the god of seed sowing, who reigned during a golden age of bountiful harvests, peace, equality and good will among people. The festival consisted of seven days of feasting, revelry and gift giving. Images of Saturn were decked with holly and holly branches were carried in processions and exchanged with gifts.

As Christianity gained influence in the Western World, many elements of these ancient religions were incorporated and the holly tree—once sacred to a pagan god—is today a symbol of Christmas. Indeed, the name "holly" may actually be a derivative of the word "holy."

In many parts of the Southeast where American holly (*Ilex opaca*) thrives in rich hardwood bottomlands, it is known for its use in Christmas decorations. The tree often reaches 40 feet in height with a trunk 2 feet in diameter. Specimens 4 feet in diameter and 85 feet tall have been reported. The wood is hard, almost white in color and very fine grained. Its texture is so uniform that the growth rings are barely distinguishable. Such a hard, light-colored and even-grained wood is ideal for cabinet work, turnery and marquetry. It takes stains and dyes well and is used for veneers and inlays on musical instruments and furniture. Because of the wood's resemblance to ivory it has sometimes been used in its natural color for white piano keys and dyed black for the black keys.

Hollies were often planted in colonial gardens to lend a formal elegance. George Washington wrote about holly a number of times in his diary. On March 28, 1786, he received a number of small hollies boxed with earth as a gift from Colonel "Lighthorse Harry" Lee (Robert E. Lee's father). He planted these along the south semicircle at Mt. Vernon, and some of them are still growing there today.

Holly is in flower betweeen April and June. The male and female flowers usually grow on different trees, and it is the female flower, of course, that bears the fruit. This explains why some trees bear large crops of berries while others in the same locale bear none. The berries, though somewhat toxic to humans, are a valuable food for wildlife including quail, grouse, turkeys and over a dozen species of songbirds including robins, cedar waxwings, mockingbirds, and catbirds.

Although most of us can identify only the smooth wood, red berries and prickly evergreen leaves of the American holly, there are other members of the holly clan. In fact, most species of holly have leaves with no prickles. Some also have deciduous leaves that drop in the fall, and some have black or even yellow berries. The flowers of certain hollies produce nectar in great quantities, the leaves of others are used for tea, and still others have branches used to make brooms. North Carolina is the home of at least 10 different species of holly. They all belong to the genus *Ilex* (which is the old Latin name for European holly-oak).

One of the most famous Carolina hollies is yaupon holly (*Ilex vomitoria*) also known as Carolina tea. It grows prolifically in the maritime forests on the Outer Banks and other locations near the sea. Yaupon leaves are used to make a delicious, stimulating tea. The leaves contain caffeine. In the past there was a lively commerce in yaupon tea leaves around Hatteras. In recent years it has been served in fashionable sea coast restaurants. Yaupon tea is very similar to the popular South American beverage Yerba maté (*Ilex paraguayensis*) which is most frequently sold in this country under the trade name, "Morning Thunder Tea."

If you are interested in sampling a cup of yaupon tea, don't let the ominous sounding Latin species name, "*vomitoria*," scare you. This refers to early explorers' accounts of southeastern Indian tribes who brewed large amounts of yaupon and other herbs together into a powerful ceremonial potion called the "black drink." This brew induced vomiting and was believed to promote cleansing and a clarity of mind in preparation for important councils and ceremonies.

I have drunk Yaupon tea on numerous occasions and find it slightly stimulating and very pleasant. The leaves can be brewed either fresh, dried or roasted.

Another holly much known and appreciated by Coastal Plain beekeepers is a black-fruited shrub known as gallberry (*Ilex glabra*). Great thickets of gallberry cover much of the pinelands, savannahs and low woods in the eastern half of the state. It flowers in May and June and bees kept near gallberry thickets almost always produce a surplus of delicate-flavored, light amber honey.

In the days before lawns and lawn mowers, people customarily kept their yards clear of any vegetation or ground cover. Dirt yards were regularly swept clean with a "yard broom" made by tying a cluster of branches together onto a handle. Because of its thin resilient twigs, gallberry was often the material of choice. Itinerant broom makers would sell these brooms, traveling from town to town singing:

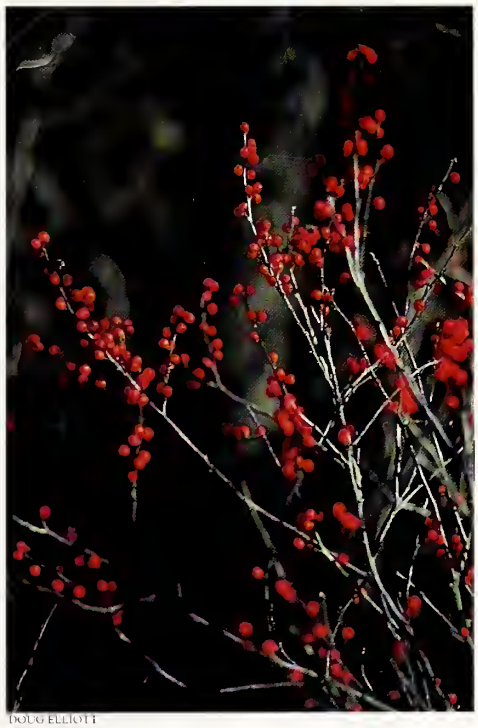
Gallberry brooms! gallberry brooms,
Make your front yard as clean
As your upstairs rooms...

There is another holly that I often see in the mountains. It is a small tree with soft, smooth deciduous leaves. When I point it out to friends, most find it hard to believe it is a holly. It is so inconspicuous and uncharacteristic of holly that it was not even recognized as such by botanists until 1840. It was originally named *Ilex montana*, mountain holly, but its name has been changed. It is now known as *Ilex ambigua*—doubtful or ambiguous holly!

Soon, many of us will be making or buying wreaths of holly, or placing springs of holly on the mantle. It's a good time to recall holly's ancient link to this season of good cheer. And while you're gathering those sprigs or looking for a tree, you might want to see how many other less familiar hollies you can find. They're more common and found in more places than you think. ⊠

***A Christmas tradition** today, holly's ancient religious roots extend back to the druids of western Europe and pagan fertility rituals. Cassena or dahoon holly* (Ilex cassine), *opposite, is a resident of bogs and pocosins on the Coastal Plain. Gallberry holly* (Ilex glabra), *right, is also common on the Coastal Plain where bees work its delicate white flowers to produce copious crops of honey. The winter holly* (Ilex verticillata), below, loses its leaves in winter but keeps a bright red sprinkling of berries that enlivens this season of gray.

DOUG ELLIOTT



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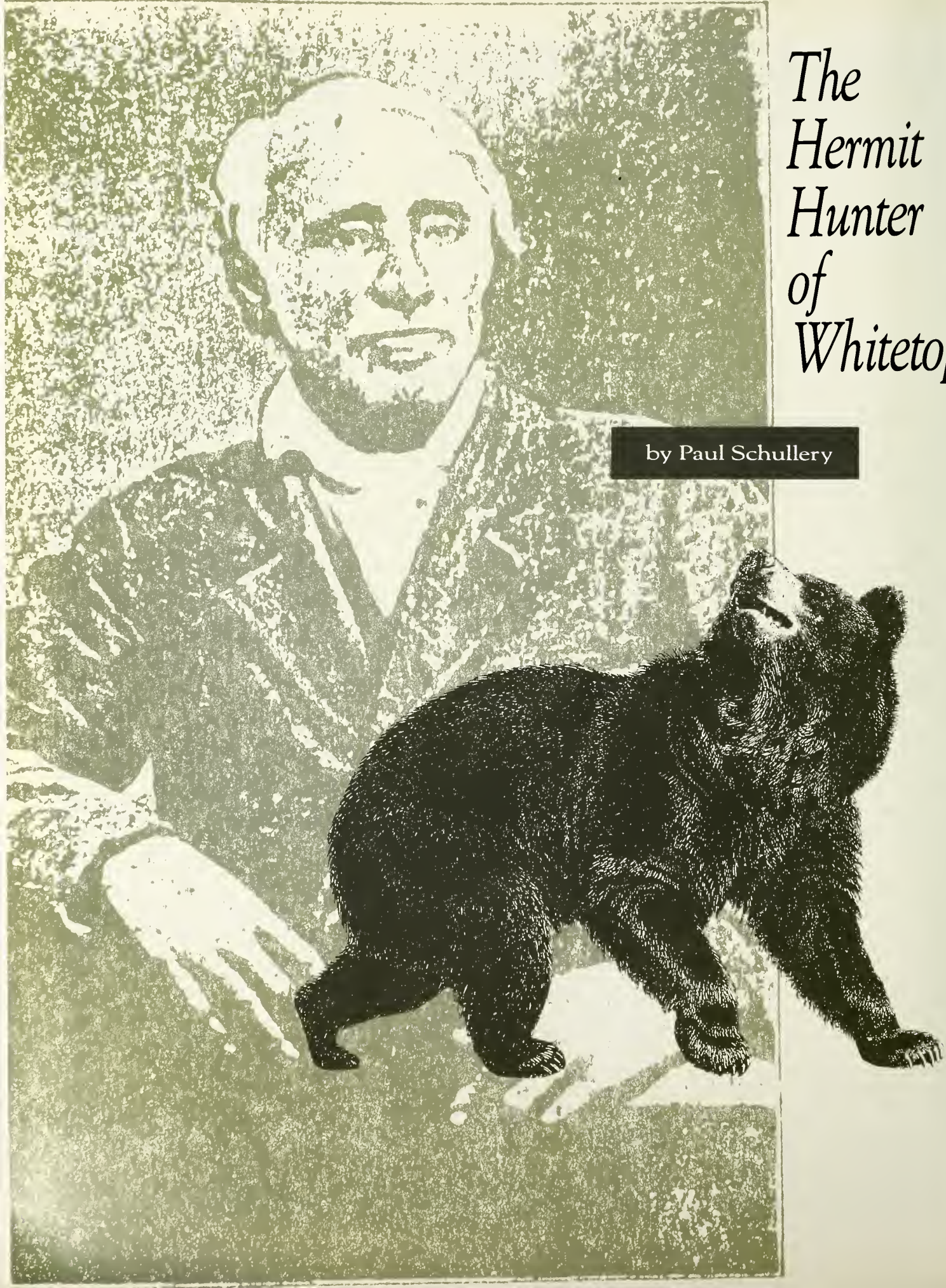


The Hermit Hunter of Whitetop

by Paul Schullery

Paul Schullery is author of The Bear Hunter's Century: Profiles From The Golden Age Of Bear Hunting, *published in 1989 by Stackpole Books, 252 pages, $19.95. The excerpts from this book, reprinted here, are about one of these legendary hunters, Wilburn Waters. Schullery credits Charles B. Coale (1807-1879), a newspaperman from Abingdon, Virginia, with gathering accounts of Waters' adventures and publishing them in 1874.*

Wilburn Waters was born on November 20, 1812, in Wilkes County, in northwestern North Carolina. His parentage was sufficiently romantic for a much more glorious story than he became. His father was French, a Huguenot whose hot temper led his friends to suspect that his presence in North Carolina was not entirely a matter of personal preference — that he might have been fleeing the law in some other state or the Old World. His mother was half white, half Catawba Indian.

Wilburn Waters was the youngest of five children, and his mother died when he was no more than three. He had little recollection of her except for her nearly floor-length black hair. His father unceremoniously dumped the children on relatives, remarried, and vanished, leaving Wilburn to be reared by a variety of relatives and strangers. In his fifth year, young Waters served a brief apprenticeship to a saddler, then went to work for the sheriff of Wilkes County, staying there for eleven years.

At that age, Waters was already well on his way to becoming a hardened outdoorsman, and had already had his first encounter with a bear. When only twelve, he got too close to a pet bear owned by a neighbor and was almost mauled. The animal was staked on a short chain, and seemed friendly enough when Waters tried to feed it, but soon the bear had a paw on each of Waters's shoulders and then suddenly attempted to entangle the boy's legs with its hind feet. Waters, realizing his predicament and suspecting that the bear intended to hold him or harm him, found it possible to gradually back away to the full length of its chain and then suddenly pull free. "He did so," Coale related, "leaving part of his clothing in possession of the bear, which became terribly enraged at his escape."

The rest of Waters's childhood and young manhood were spent in adventures and conflicts with deer, wolves, snakes, and society, the last of which seemed least to please him.

At the age of nineteen, for reasons that remain unclear, Waters went to live with a country parson in Ashe County, the extreme northwest corner of North Carolina, where he established himself as the county's foremost turkey hunter and began to make a reputation for himself as a wolf hunter as well. Word of his skills got around, and he

found himself in demand with farmers whose stock were being killed by wolves; he also found some income in bringing in wolf scalps, which he sold for as much as $20. He was once paid $175 by grateful farmers for taking a pack of five very destructive wolves in one day. It was in this new home that Waters also began to get himself involved in the sort of hairbreadth escapes and derring-do that makes his name so famous even today on the North Carolina-Virginia line.

At the recommendation of friends, Waters moved in his twentieth year to the immediate vicinity of White Top Mountain, just across the the line into Virginia. According to Raus Hanson's *Virginia Place Names*, White Top is the second-highest mountain in the state, at 5,520 feet: "Formerly called Iron Mountain. 500 acres across the crest has a fine white grass which glistens like a glacier; this explains the mountain's name." I'm not sure if this is an example of what are called "balds," those being large permanently open areas on the tops of various southern peaks. It appears that some settlers grazed stock on White Top, and that may have affected the summit. In any case, it was here that Waters found the homesite he wanted, in a little "cove," or sheltered valley, where he lived most of the rest of his life, the first four years in a tent. He filed a claim on 640 acres, and lost no time in hitting the trail for whatever big game he could find.

For all his previous hunting, Waters had apparently never seen a bear in the wild. The first of the six he killed that year he came upon near his camp while deer hunting. The bear was standing on a log, facing him, and Waters shot it through, the ball entering its head, going through the heart, and continuing to the animal's rear.

None of Waters's first few bears was any greater challenge than that, but late that first fall his hunting career was almost shortened dramatically. Snow had come, and he was hard on the trail of a large bear late in the day, so he decided to camp where he was rather than return to his tent, in order to have as fresh a trail as possible in the morning. The snow did not let up during the night, though, so the bear trail was completely lost. Waters soon crossed the trail of a raccoon, and being both fond of coon meat and ravenously hungry after a day without dinner and a morning without breakfast, he followed. Quite by accident, he thereby came upon the recumbent form of a large bear asleep in the snow.

At first Waters took it for a bearskin left by some other hunter, but what little he could see of the skin was slowly moving up and down as the bear breathed. Getting up close to it, he was still unable to tell, from the small patch of black fur that was visible, just how big this bear was. He shot.

Up from the snow rose an enormous bear, twice his size, "surging and whirling as if it had been stirred by a hurricane into a column of fog," towering over the hunter and infuriated by pain, locating the source of the pain and charging all in one swift explosion of snow. Waters, with no time to reload and lacking the instructive aid of many modern movies that surely would have taught him to wrestle the bear and stab it to death with his pocketknife, resorted to that oldest of bear hunter's tricks — running away. And, though he was new at this, he

also knew that he could not hope to outrun a bear, so at the first opportunity he circled a large tree. At the instant he was out of the bear's sight behind the trunk, he leaped for a branch, held it with one hand (his other still held the useless rifle), and bunched his legs up under him as high as he could.

The bear, nose to the ground and in a great angry hurry, raced by right under Waters as he hung there swinging slightly back and forth. Bears aren't known for their eyesight, and this one had no reason to think its enemy would suddenly become airborne; it just kept going, assuming Waters must be somewhere in the snow up ahead. But it didn't go far, probably because it picked up his scent right there. And so Waters had to hang on for a few minutes while the bear ripped up the undergrowth all around below him in its rage. What Waters saw it doing to the rocks, brush, and small trees was sufficient incentive for him to hang on tight.

Finally, the bear took off back down Waters's track, giving the hunter a chance to drop down and reload. Waters heard the bear thrashing around in the heavy vegetation nearby, apparently engaged in some more landscaping, so he cautiously followed it. Peeking through the brush at the edge of a small opening in the forest, he saw the bear "making a furious attack upon a rock that protruded out of the snow." It was, at that point, relatively easy to shoot him in the head, which Waters did. The bear, we are told, weighed nearly four hundred pounds.

The Civil War, surely the greatest domestic intrusion on American life ever, had its effects even in the remote highlands. There was little powder for hunting, and few hunters about, so those areas not devastated by battle or foraging troops experienced a recovery of game populations that was not always welcome. Waters hunted less, if at all, and stayed close to home to protect his modest property. The bears, of course, flourished.

[One day around the time the war ended, Waters attempted to capture a cub alive, having left it treed by his dog.] He then hurried a few miles to a cabin he knew of, but could find no men to help him, only two women who, as it turned out, were more than willing to help. He arranged to meet them at the tree in the morning, returned, and spent the night tending the fire and watching the cub climb nervously about in the branches.

The women arrived as promised, and he stationed them nearby with appropriate gear for tying and securing the cub. The cub, seeing the fire out and growing restless, finally descended the main trunk. Just as it was about to step onto the ground and escape, Waters was there to grab the hind feet.

It's at this point in the story that it becomes clear that this is not a springtime cub, not a little five-pound bundle of cuteness. This seems instead to be a late-season cub, perhaps even a yearling still hanging around from the previous year. It sounds to me that it must have weighed forty pounds, at least. It was big enough, in any case, to run with its front legs, as "away they went down the mountain side wheelbarrow fashion, at a rapid rate, regardless of whatever imposed." Knowing something of the ruggedness of that country, I am confident that many things *did* impose. But somehow Waters managed to move up from the hind legs and even get a grip on the bear's neck, more or less riding it partway down the mountain, all the time being snared, gouged, ripped, and grabbed by passing bushes and rocks. By the time they got to the bottom, Waters was pretty well undressed, still having one good sock, his suspenders, and a shred or two of his pants, but otherwise being stripped to the skin.

The women, chasing down the hill at a slower pace ("as they had no bear to ride," quipped Coale), did not miss the assortment of shredded garments along the way, and were quick to take Waters's suggestion—called to them from the cover of a mountain laurel—that they let him take care of the cub and just go get him some help. The women left, and Waters made a suitable rope from his suspenders, tying the cub well enough to get it to his cabin, where he also got some whole clothes.

That was not the only bear Waters rode, nor the most dangerous. It was New Year's Day, 1873, and the hunter of White Top, now sixty years old, was no longer living on his little homestead. He lived with Clark Porterfield, an avid hunter who maintained a good pack of dogs.

The footing was wretched, snow over ice, so that travel in the mountains was adventure enough without trying to find a bear to shoot. But despite Waters' reluctance, Porterfield persuaded him to go. Soon enough, the dogs were off on the trail of a bear, and the old hunter felt the thrill of it to the point that he soon outdistanced Porterfield and scrambled recklessly up the slopes—falling, rising, slipping, crawling, but always climbing—until he broke into a little clearing and saw that the dogs had treed not one but three bears. Picking the largest one, Waters took a shot with his shotgun, trying first the barrel loaded with a ball, which had no effect, then the barrel loaded with buckshot, which brought the bear down the trunk of the tree and into the midst of the dogs.

In seconds, one dog was crippled and the bear had another one by its head. As the bear and dog slipped away from the tree and rolled down a steep gorge, Waters was after them, armed only with a tomahawk. This seems less cautious than his behavior as a young man; but, as Coale said, it all happened "before he had time to reflect on the situation." When Waters arrived in a cloud of snow at the bottom of the ravine, the bear let go of the terribly wounded dog and turned on him. There followed a frantic dance of swipes and parries as the bear tried to get him and as he gave it what punishment he could with his tomahawk, which, judging from the effect it was having, must have been a steel-bladed ax. The bear turned from this fight and rushed for a cliff, apparently, to Waters, in the hope of jumping

from the cliff to nearby trees and then to safety. But Waters grabbed a handful of black fur and found himself mounted, loosely, on the back of the retreating bear. He took this opportunity to give the bear a really authoritative smack on the skull with his tomahawk, which brought it down just as its front end slid to a halt hanging over the cliff. The ride would have gotten a lot worse from there on out, and Porterfield was overjoyed to find his older companion safe. Nobody even minded that the other two bears got away.

At least one other writer left us an account of Waters in a hunt. A southern artist named David L. Clark hunted with Waters and Coale during the Civil War (the exact date is not known). Clark, who later painted a portrait of Waters, wrote an autobiography in about 1895, *The Roving Artist, A Biographical Sketch*, a book now difficult to find, and devoted most of a chapter to the hunt. I will quote most of it, because it's such a rare first-hand account of a man who we know only slightly, through the eyes of an amateur biographer.

"Capt. John M. Preston, an acquaintance and friend of ours residing at the Seven Mile Ford (17 miles distant) dispatched to Mr. Coale and myself to come at once, stating that a very large bear had been seen in one of his cornfields, and that he had already dispatched for Wilburn Waters, who would join us in the hunt. Whereupon we immediately set out for the home of Captain P., armed and equipped for the emergency. At about 2 o'clock at night we were rapping at the door of our friend, who kindly conducted us to a room for a few hours sleep, and whilst thus refreshing ourselves preparatory to the hunt, the voice of the old hermit hunter came sounding in our ears. This was the first time I had ever seen Wilburn Waters, and here he stood with his unerring gun and faithful dog, Jack, who seemed as anxious and eager for the hunt as did his master. Never had my eyes fallen upon a more remarkable man, on who had killed hundreds of bear, deer, wolves [and] all manner of wild beasts and fowls, with which that wild mountain country is inhabited. But the most remarkable characteristic of the old hunter was his power of imitation, he could imitate, almost to perfection, the very cry or note of the victim of his gun, when describing it to you and what seemed still more remarkable, he could throw himself into a very close resemblance of the animal itself—Wilburn bid us hasten to the chase. The sun had scarce dispelled the darkness of the night when all parties were in the field. Here were most striking indications that bruin had been about, and yet the trail was too cold for Jack, though I had never seen a dog hunt with more energy. But I was more particularly impressed with the actions of Wilburn, than his dogs, though each seemed to understand the other, and both kept close together in the hunt. One moment scenting thro' the broad and open field, and the next moment, as it were, climbing over craggy rocks and precipices which would seem almost impossible for mortal man to reach. There was in his veins just enough of Indian blood to make him a perfect hunter. We found several bushels of corn deposited in a piece of woods, near by the field, which had evidently been borne there in the arms of bruin. We called to Wilburn to bring his dog. Soon the old hunter was at the spot, but Jack could not catch the trail. Yes, Wilburn remarked, the bar has been here sarten, but it is not about here now or Jack would a bin axin him some questions. But where do you think he is Wilburn, I inquired? Well, replied the old hunter, he may be ten, twenty or thirty miles from here now. And yet you say that perhaps he may return to this corn tonight. Why yes, that is just the nator of the brute, a bar don't mind traveling 50 miles more'n you mind traveling one mile.

"Controlled entirely by the judgement of the celebrated old bear hunter, we deemed it unnecessary to pursue bruin any further on that day and all parties repaired to Capt. P's for refreshment and rest. But passing down the river, we discovered that Wilburn had wandered off to himself and was sitting on a log seemingly in a pensive mood. Neither of us could imagine what change could have come over the spirit of the old hunter's dreams. Mr. Coale suggested that perhaps one of our party may have used profane language in his presence, and if so that we were done with Wilburn. This proved, however, to be only some plans that were revolving in the mind of the old hunter by which he might overtake bruin. We were soon all together again, listening to Wilburn's marvelous hunting stories."

Unlike many hermits and other social oddballs, Wilburn Waters has been remembered with affection in his neighborhood. His association with camp meetings and various other religious activities made people think more of him, and he lived in a day when cleaning out wolves and bears from the forest was heroic work. Anybody going off to live on a mountain by himself now would either be labeled a misfit or ridiculed as a budding young Thoreau trying to do something worth writing about. Waters fared well in public opinion, and even at the time of his death, in 1879, he was recognized as being, in his own peculiar way, a useful and important citizen.

Over time his reputation grew, so that he now has a secure niche in the history of southern Virginia and northern North Carolina. Coale's book, or portions of it, has been republished twice—in 1929 and 1960—and at least one novel has been based on his life. In 1957, Reverend M. D. Hart, of West Jefferson, North Carolina, a grandson of one of Waters's close friends, led a successful effort to have a monument erected to Waters, and even so long after Waters's death, contributions were received from more than a hundred people.

Wilburn Waters may not be known at all more than a few hundred miles from White Top, but close to home he's still a lively topic of conversation.

WHITE ON THE BLUE RIDGE

When winter's relentless troops storm these ancient ramparts, the aftermath is beauty so fragile that only a few of us get to see it.

WHITE ON THE BLUE RIDGE

A close and solemn stillness shrouds the crest of the Blue Ridge. Winter's blizzards leave a cloak of wet snow, but snow is not the only natural force that robes these Appalachian monarchs. Dense, cold fogs may also freeze, coating the trees and brush with rime ice. Freezing rain creates yet another icy wonderland, glazing trees like crystal chandeliers that tinkle gently in the holy silence.

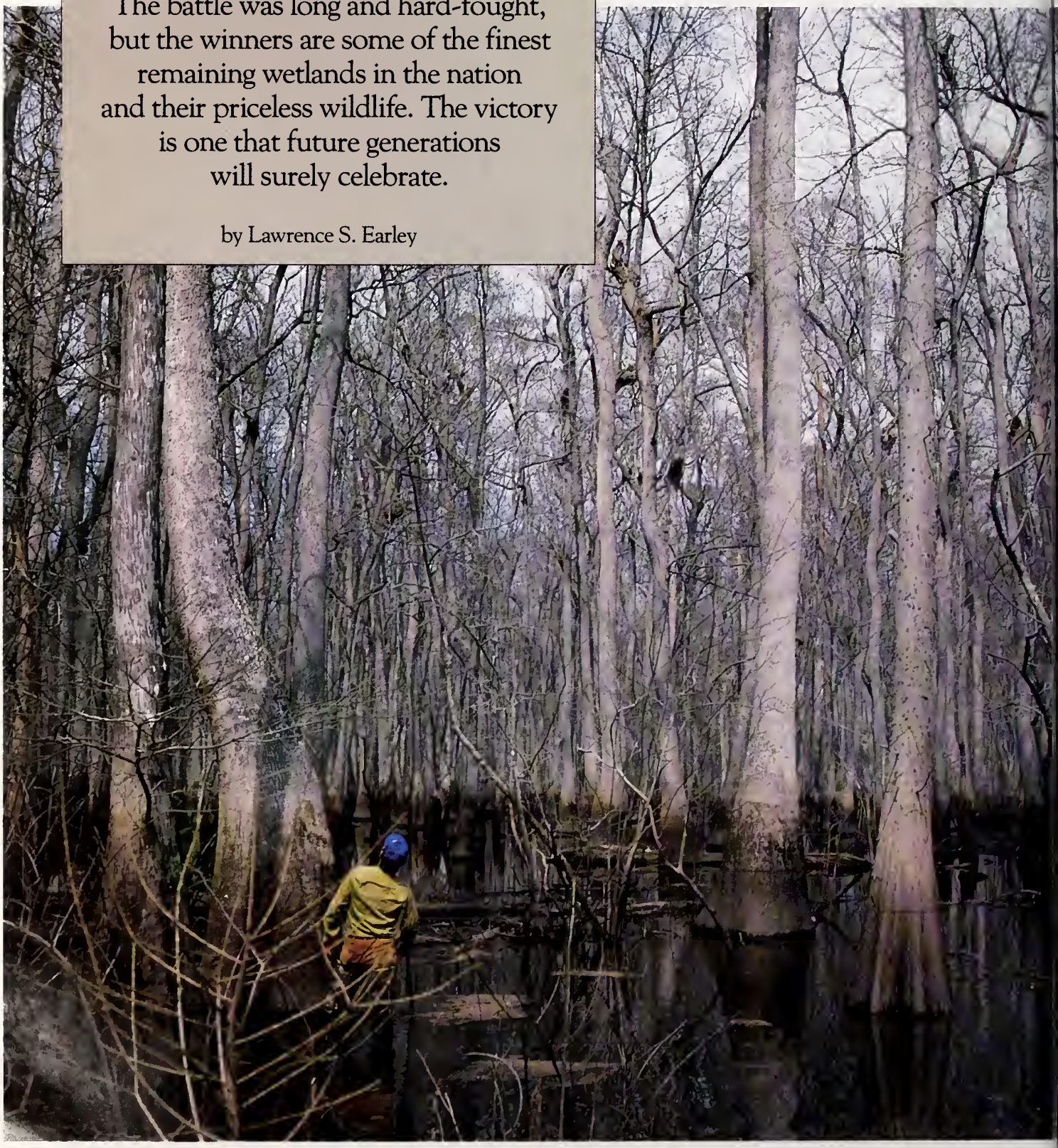
WHITE ON THE BLUE RIDGE

A mountain glade wears its mantle of snow, far removed from summer's bounty. One is reminded of Wordsworth's "fairylands forlorn," yet magic lingers in the lacy artifacts of that fertile season. Some cosmic painter has chosen a limited palette, delicately tracing the sere limbs and tinting the white canvas with a blush of remembered color.

The BATTLE *for the* ROANOKE REFUGE

The battle was long and hard-fought, but the winners are some of the finest remaining wetlands in the nation and their priceless wildlife. The victory is one that future generations will surely celebrate.

by Lawrence S. Earley



DENNIS LUSZCZ

When it happened, the muddy Roanoke didn't suddenly reverse its course, flowing backward into Virginia, past the dams, upward into the Blue Ridge. Nor did the wild turkeys along the Roanoke bottoms observe a moment of silence. The whitetails, from all accounts, didn't lift their flags in unison, and the clamorous heronries, deep in the swamplands, didn't fall quiet.

None of these things happened after the events of last August 14. What did happen was this: Governor James Martin approved the creation of the 33,000-acre Roanoke River National Wildlife Refuge, and conservationists nationwide rejoiced on behalf of the river and its rich wildlife habitats. It was wildlife that was the ultimate winner of the drawn-out battle for the refuge, wildlife that would benefit in perpetuity. But perhaps all of us could take hope from the achievement gained, for against spirited opposition waving the banner of economic development, a tough but correct decision had been made.

The agreement (See "Terms of the Agreement," p. 26) represented a compromise that differed from the original proposal for the refuge as presented in late 1987. Then the U.S. Fish and Wildlife Service wanted to buy about 30,000 acres of Roanoke River wetlands in Halifax, Bertie and Martin counties, with a significant portion of its acquisitions to be in Martin County. The Commission already had a foothold on the river with its Roanoke River Wetlands, six separate riverine tracts in the same counties that totaled 13,600 acres. The refuge would fill in the gaps between the Commission tracts and thus protect a larger, more contiguous area. Between the federal refuge and the state gamelands, nearly 45,000 acres of some of the richest bottomlands in the Southeast would be protected.

__Giant tupelo__ gum trees dwarf a visitor in Conoho Swamp, along the Roanoke bottoms. The Roanoke River's floodplain contains some of the most extensive swampland in the Southeast. The Roanoke River National Wildlife Refuge and the Wildlife Commission's properties will protect 47,000 acres of bottomlands.

But to buy the necessary lands, the Service planned on using money from the Migratory Bird Conservation Fund which comes from the sale of federal duck stamps. In doing so, the federal agency would have to get the approval of the Governor. The question was, what would local sentiment be about such a proposal?

"We pointed out that they could expect considerable opposition from local interests," says Richard Hamilton, assistant director of the Wildlife Commission, who was present at these early meetings. "The local people had suspicions of the federal government and also had strong interests in the area themselves, from the standpoints of economic development and traditional hunting." Several hunting clubs held leases from timber companies and other large landowners along the Roanoke. These clubs had held the land for many years. The hunting was fabulous and members could hardly be expected to give up their exclusive rights without a fight.

The battle that ensued wouldn't have been as dramatic or as bitter if both the opponents and the proponents of the refuge didn't value the Roanoke as much as they did, even if from different points of view. On the one hand was the Roanoke as seen through an economic filter—all that undeveloped, pristine riverine land. On the other hand, there was the Roanoke as seen by conservationists—the most intact and extensive bottomland wetland system in the mid-Atlantic.

The Roanoke River enters North Carolina from Virginia west of Roanoke Rapids and snakes for 137 miles to Albemarle Sound. It may not be the longest river in the state, but it has the widest floodplain—in some places five miles broad—and the richest bottomlands in the state. For

KEN TAYLOR

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Fingers of hardwood *uplands often alternate with sloughs and backswamps in the Roanoke's floodplain. This diversity of food-rich habitats supports thriving populations of fish, mammals and birds, including raccoons (right) and great blue herons (above). The swamps are critical winter habitat for waterfowl, including mallards (above, right) and the threatened black duck.*

KEN TAYLOR

centuries, floodwaters have dumped fertile sediments from the mountains and Piedmont onto the floodplain, encouraging a diverse food chain. Though the teeming game species and the massive spawning activities of striped bass had made the river legendary among hunters and fishermen, few had given any thought to any of the other values of the river.

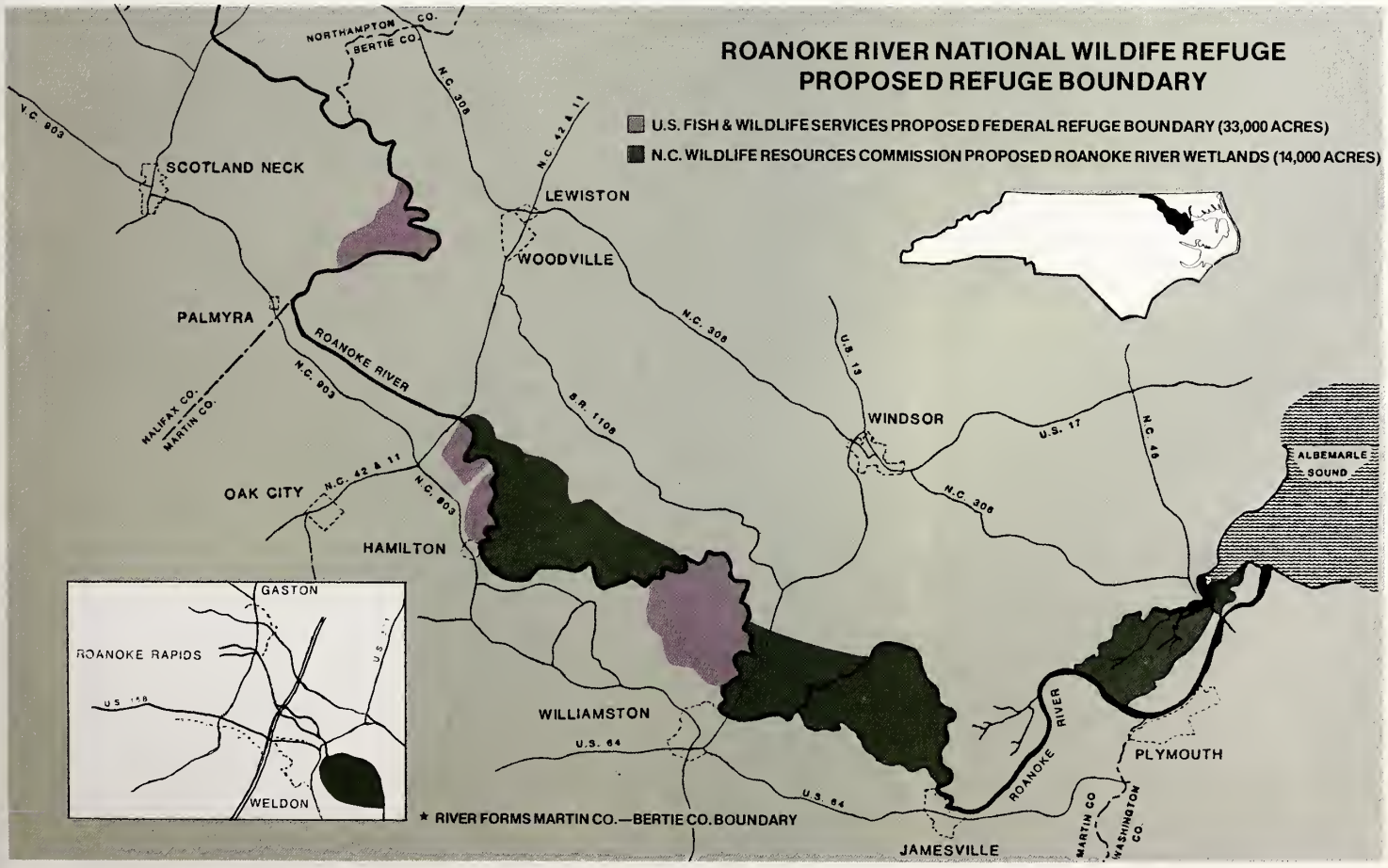
Then in the late 1970s, the Nature Conservancy and the state's Natural Heritage Program sponsored a biological inventory of the Roanoke River. For five years, contract biologist Merrill Lynch surveyed the river looking for areas of uncommon value. He found vast baldcypress-tupelo gum swamps, high bluffs with unique soils that hosted wildflowers more common in the Ohio River Valley. There were marl cliffs with fossil sea shells, evidence of the frequent rise and fall of ancient seas. Lynch found heron rookeries, seven of them, as well as unusual incidences of wildlife—the northern extent of the Mississippi kite; an eastern population of mountain-loving cerulean warblers. He noted how floodwaters floated nutrients out of the swamps and down to the Albemarle, where they make a rich broth for young finfish and shellfish.

When he finished his survey in 1981, Lynch had identified 20 areas with significance as habitats for wildlife and rare plants. They ranged in location from Weldon, near the North Carolina-Virginia line, to the mouth of the river at Albemarle Sound. Based on his findings, the Nature Conservancy made the protection of the Roanoke River a national priority.

This early biological inventory focused attention on the Roanoke as never before. Not surprisingly, the Roanoke's vast wetlands began to figure prominently in a series of nationwide plans to protect disappearing waterfowl habitats. The river's wetlands were especially valued as wintering habitat for critically low populations of black ducks. The latest of these plans is the North American Waterfowl Management Plan, which seeks to protect and enhance 6 million acres of nesting, migrating and wintering habitat in the United States and Canada by the year 2000. The plan identified the Roanoke as a "focus area."

"Not only did we stress the value of the Roanoke for black ducks and other waterfowl," says Dennis Luszcz, the Commission's waterfowl project leader and a member of one of the Management Plan's technical committees, "but we made a real point of taking into account other wetland values, such as the protection the river offers to endangered species like the bald eagle, or its value to water quality. Any way we looked at it, the Roanoke still came out on top because it's just full of valuable wetlands and that's why the ducks are there."

Beginning in 1983, the Nature Conservancy and the Wildlife Commission worked together to acquire properties as they came



Terms of the Agreement

The Roanoke River National Wildlife Refuge was approved by Gov. James Martin on August 14. Four days earlier, on August 10, the N.C. Wildlife Resources Commission and the U.S. Fish and Wildlife Service reached agreement on a compromise plan for the refuge. Here are the main points of the memorandum of understanding signed by the two agencies.

- The Roanoke River National Wildlife Refuge will consist of 21,745 acres in Bertie County, 1,939 acres in Halifax County, and 9,253 acres in Martin County. The Service excludes from its proposed acquisition all Martin County lands except the tract known as Devil's Gut.
- The U.S. Fish and Wildlife Service will seek to acquire from willing sellers the nearly 33,000 acres by fee purchase, gift, lease or exchange. It will use Duck Stamp monies to buy the lands.
- The Wildlife Commission will trade its Roanoke River Wetlands in Bertie County, a total of 11,500 acres, to the Service. Replacement lands of equal ecological value will be bought in Martin and Halifax counties for the Commission.
- Under the state's Nature Preserves Act, several of the Commission's tracts have been dedicated as nature preserves. These dedications will be removed before the tracts are acquired by the Service. The Commission will dedicate tracts within the replacement lands identified as appropriate by The Nature Conservancy.
- The Wildlife Commission and the Fish and Wildlife Service will cooperatively manage both the Service's refuge lands and the Commission's wetlands. Each agency will retain primary jurisdiction over the administration of their individual properties.
- Hunting, fishing and and other traditional uses of these lands will continue where there is no conflict with the primary management objectives of the refuge.
- A single hunting permit for both state and federal lands will be issued by the Wildlife Commission.

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up for sale. From 1983 to 1988, the Commission acquired six properties, using funds from the Endangered Wildlife Fund, the Waterfowl Fund and the N.C. Wildlife Endowment Fund. Other contributors were The Nature Conservancy, the N.C. General Assembly, the Department of Transportation and Ducks Unlimited. In all, nearly 14,000 acres were purchased — in Halifax County, 1,200 acres of the Urquhart Tract; in Martin County, 650 acres of the Speller-Outlaw Tract; and in Bertie County, Great and Goodman islands, the Broadneck Tract, Conine Island, and Company Swamp — 11,500 acres in all. These lands represented some of the best wildlife habitats along the river.

When the proposed refuge was announced early in 1988, most of the opposition to the refuge emanated from Martin County where the Board of Commissioners opposed the refuge. In Bertie and Halifax counties, meanwhile, the boards of commissioners had supported the refuge. Opponents crowded public hearings in Williamston and Raleigh. They derided the Fish and Wildlife Service's claims that the river was valuable black duck habitat. In Raleigh, Martin County commissioner Henry Winslow expressed concern that the refuge would have a negative effect on the county's tax base and would hinder the county's economic development. Others feared that federal ownership of the land might mean the end of traditional hunting.

But supporters of the refuge pointed out that much of the land to be acquired by the Service was wetland where any development activity would be severely regulated if not totally banned. Moreover, taxes paid by the federal government for these lands would be more than they were currently getting from the companies that owned them.

"Also, I think a lot of folks realized that the Roanoke's bottomlands were being cut and then converted to sycamore, and, in some cases, sweet gum," says Tommy Hughes, a Commission biologist from New Bern. "I think a lot of them had the foresight to look back and realize that something had to be done or the land would be lost."

On March 6, 1989, the Wildlife Resources Commission voted unanimously to support the refuge. It was now up to the Governor. In July and August, Governor Martin held a series of meetings for opponents and proponents of the refuge. Among the private conservation groups represented at these meetings were the Nature Conservancy, the N.C. Wildlife Federation, the N.C. Conservation Council and the Sierra Club. "Our meetings with the governor went extremely well," says Katherine Skinner, director of the North Carolina Nature Conservancy. "We had some very good expertise in there and they knew what had to be said. The Governor is a very factual man. 'Keep to the facts,' he said, and that's what we did."

Slowly the outlines of a compromise emerged. By the time the Governor made his announcement, most of the principals were in agreement with the main points. In deference to Martin County's objections to the federal presence, the Wildlife Commission and the Fish and Wildlife Service agreed to a swap: the Commission would give its Bertie County game lands to the federal government for lands in Martin County that would be acquired. The two agencies would jointly manage the refuge, but the Wildlife Commission would administer the hunting on the refuge.

"It's unique," says Richard Hamilton of the cooperative arrangement. "The state and federal government will share in the management, administration, protection and enchancement of the area. The Commission will administer public hunting so hunters can deal with one agency, not two." Hunting, fishing and other traditional recreational activities would be allowed where they did not conflict with management objectives on the refuge. Hunters would apply in advance for randomly selected permits, a method used successfully last year on the Commission's Roanoke Wetlands.

"The final proposal that Governor Martin orchestrated made the project stronger than it was," says James Pulliam, regional director of the U.S. Fish and Wildlife Service's southeast region. "The ownership is more unified now, with the state on one side of the river and the Service on the other. It may have been a long and cumbersome process, but that's the world we live in now."

Hamilton admits that the compromise hurt, but that there was no other way to save the refuge. "We're giving up some high quality lands," he says, "but we'll be holding out for lands of equal value."

In retrospect, there were two principles that were ratified in the lengthy battle over the Roanoke River National Wildlife Refuge. One of them was the value of the working relationship between a public agency — the Wildlife Commission — and private conservation groups. The Nature Conservancy in particular played a strong leadership role in both identifying important lands for public acquisition and in championing the proposal. Yet there were other heroes. "Without the N.C. Wildlife Federation and its grass-roots letter-writing campaign, it couldn't have happened," says Katherine Skinner.

But perhaps the biggest principle ratified in the passage of the refuge is the one that might be called "the big picture." Increasingly, we're being asked to look at our local natural resources with an eye to national and even international needs. It makes for predictable conflicts.

"The local people are tied to the Roanoke in a wonderful way," says Earl Gillis, a supervising biologist with the Wildlife Commission. "But you have to look at the big picture on these Roanoke River wetlands. This place is of national significance, not just local significance. And when you start talking about habitat types that have significance nationwide, that have significance for species that cross national boundaries — that sheds a little different light on the situation. And then when you look at the amount of wetlands we're losing every day, when you look at the waterfowl populations plummeting and the habitat being degraded, it's time to do something. And the worse day to do it is tomorrow. Today is the best day to do it."

That kind of thinking has protected some of the finest remaining riverine wetlands in the country. The wisdom of that decision will be recognized in the years ahead.

***Historically, the** wide floodplains of the Roanoke have discouraged development activities, leaving some sections of the Roanoke River corridor nearly pristine. The Roanoke River wildlife refuge will protect these priceless bottomlands.*

Conditions For Burn Best In Winter

Controlled Blazes Helps Wildlife

Written and Edited by Vic Venters

The agency charged with the state's leading role in the fight against forest fires is sponsoring a program that encourages landowners to burn their woods. Under the Landowner Hazard Reduction Burning Program, the N.C. Division of Forest Resources will help landowners put the torch to selected forest stands.

Don't get the wrong idea, however. The program emphasizes prescribed burning, a forest management technique that can safely remove unwanted underbrush from pine stands. Excessive underbrush burns easily in dry weather, and if uncontrolled, can lead to a violent wildfire that can destroy a prime stand of timber.

This controlled burning also improves wildlife habitat by increasing the amount of herbage, legumes, browse and insects needed by both game and nongame species.

The hazard-reduction burning program is in essence a contract between the Division of Forest Resources and the landowner. The program is set in motion by the signing of an agreement which spells out the parties' responsibilities. Under the agreement, the division provides the training, supervision and support needed to perform the burn. After the landowner attends local classes, division foresters will provide the landowner with a written plan.

The hardest part of the program is waiting for proper burning conditions. Burning is best when done three or four days after the area has received rain. Under the agreement, the division will notify landowners when weather conditions are suitable for burning.

Although the program is free, the landowner has several responsibilities, one of which is to designate the locations for fire lines and for areas or structures to be protected from the fire.

The program is offered each year from December through February. For more information, contact your local county forest ranger or agricultural extension agent, or call the Division of Forest Resources at (919) 733-2162.

The Firing Line: *Controlled burning can be of benefit to both timber owners and wildlife habitat. The N.C. Division of Forest Resources is sponsoring a free program to help landowners carry out prescribed burns.*

Merry Christmas, Mr. and Mrs. Wren

Songbirds Make Wreath Winter Home

Wreath of Wrens: *The holidays are traditionally a time of hospitality, as this pair of Carolina wrens has been quick to discover. Jack and Julie Avent of Raleigh sent this photo of the wrens bedding down in the pods on their holiday wreath. Initially, the wrens found the pods so cozy that they would sleep through the opening and closing of the door on which the wreath was perched. Later, Jack moved the wreath to an outside shelf to minimize disturbance. On really cold nights, he says, both wrens sleep in the same pod together.*

Calendar Of Events

On several occasions, events in this calendar have been changed or canceled without notice. Readers should check the contact before traveling to an event. Listing for the calendar should be sent at least four months in advance.

Dec. 2-3
The second annual Core Sound Waterfowl Festival at Harkers Island Elementary School on Harkers Island features wildlife art, antique and working decoy exhibits. For more information contact Wayne Davis, Core Sound Decoy Carvers Guild, P.O. Box 308, Harkers Island, N.C. 28531 or call (919) 728-7316.

Program Available In January

Title Your Boat

This January, boat owners will be able to obtain a certificate of title for their boats on a voluntary basis. A state law passed this year by the N.C. General Assembly instructed the Wildlife Resources Commission to set up a program to provide an opportunity for boat owners to title their boats for a fee of $20. The law sets a $10 fee for transferring or duplicating the title.

Currently, the Commission administers the state's boat-registration program, through which more than a quarter of a million boats are registered.

More information on boat titling will be available as the program nears implementation on Jan. 1. Preliminary information may be obtained by writing to: Watercraft Titling, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188.

Less Than A Foot, Set Them Free

Minimum Size Established For Sea Trout

Dear Editors:

Your September issue included an excellent article on sea trout.

At the time the article was prepared, there was no creel or size limit on the important speckled trout, a fact which your article brought out.

We now wish to inform your readers that effective September 1, 1989, there is a size limit of 12 inches minimum length on speckled trout.

T.P. Williamson
Deputy Director
for Administration
Division of
Marine Fisheries

Owl Be Darned!

Saw-whet Likes Midnight Road

Dear Editors:

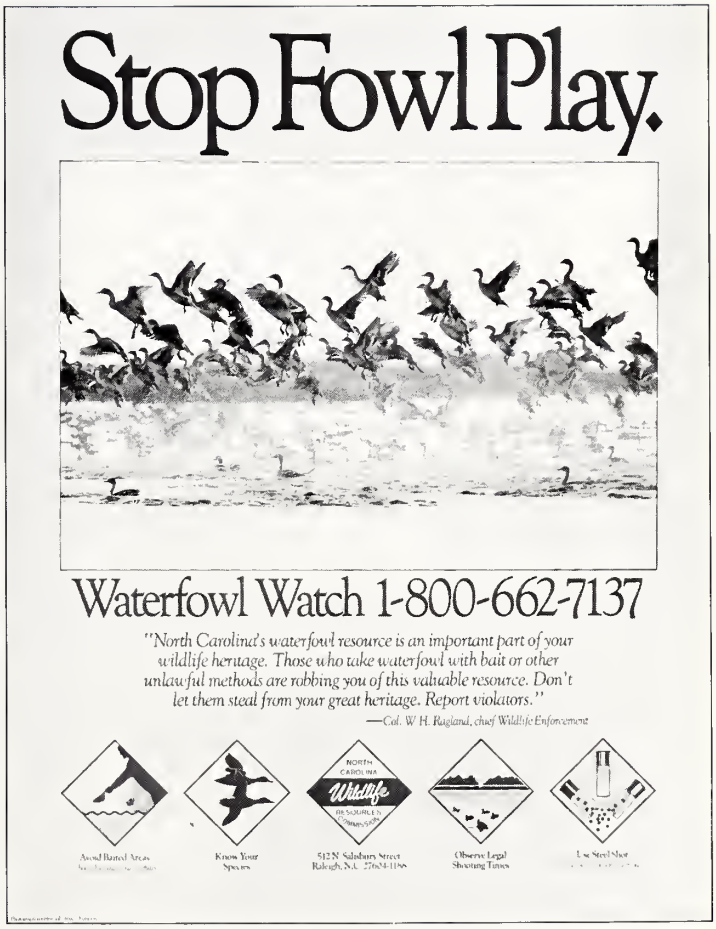
For three nights in a row when I was coming home from work at 12 midnight, I found a small owl sitting on a little used black top road. It had no ear tufts and was smaller than a screech owl. I tried to catch it, thinking it was sick, but it flew off each time. It was January and the road could have been warmer than the ground around. I never saw the owl after this. Could you explain this?

Ishmael M. Dick
New London, N.C.

From your description of the bird, it was probably a saw-whet owl you observed, according to Allen Boynton, the mountain project leader for the Commission's Nongame and Endangered Wildlife Section. The saw-whet had probably been feeding on mice or other small rodents which it had caught on the open road. Incidentally, researchers working with the Nongame and Endangered Wildlife Section discovered a saw-whet owl nest in a flying squirrel's nest box this spring. Although ornithologists have suspected that saw-whet owls breed in the state, this was the first confirmed nest site found in North Carolina.

New Poster Unveiled

Waterfowl Regs To Be Strictly Enforced



Follow The Rules: *This poster, "Stop Fowl Play," should alert North Carolina waterfowlers that the N.C. Wildlife Resources Commission will place special emphasis this season on enforcing waterfowl regulations to help protect the continent's dwindling duck populations. "We're buying special equipment and an extra enforcement effort will be focused on the waterfowl season this year," said Col. W. Harold Ragland, the enforcement chief of the Commission. "We encourage all sportsmen and citizens to report waterfowl violations." If convicted, waterfowl hunting violators should expect stiff fines and penalties, in addition to the mandatory one-year loss of the violator's hunting license. Before hunting, waterfowlers should consult the* North Carolina Inland Fishing Hunting and Trapping Regulations Digest *for the latest regulations. Violations can be reported to the phone number listed on the poster above.*

STOP
WILDLIFE
VIOLATIONS

IT'S YOUR RESOURCE
REPORT
VIOLATORS
1-800-662-7137

The 1990 North Carolina Wildlife Calendars Are Here!

***With such artwork** as "On The Prowl" by Robert C. Flowers Jr. featured above, the North Carolina Wildlife Calendar is sure to sell out again this year.*

The works of Sallie Middleton, Larry Barton, Ronald J. Louque, Bob Herr, Robert B. Dance, Mel Steele, C. Edward Swaim, Robert C. Flowers Jr., James A. Brooks and Duane Raver are featured in the 1990 Wildlife Calendar. Order yours today by returning the form below with your check or money order to 1990 Calendar, N.C. Wildlife Resources Commission, 512 N. Salisbury Street, Raleigh, NC 27604-1188.

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ONLY 1000 LEFT

North Carolina Rapidly Urbanizing

Motor Vehicle Deer Deaths Common

North Carolina has an abundant and healthy deer herd, but last year hundreds of deer were killed in nonhunter-related incidents.

A mortality report on white-tailed deer issued by the N.C. Wildlife Resources Commission's Division of Wildlife Management shows that in addition to deer harvested legally by hunters, 825 other deer were reported to have died between April 1987 and March 1988. Of that number, 451 were killed by motor vehicles, 207 were depredation kills, 91 were illegal kills and 12 were killed by predators. The remaining 64 were unretrieved hunter kills or unknown deaths.

For the past 10 years, wildlife management employees have kept records and compiled reports annually documenting the impact nonhunting-related deaths can have on the state's deer herd. The figures reflect only trends since there is no way to determine how many undiscovered or unreported deaths occur.

Last year's report showed that though hundreds of deer were killed by cars in 1988, the number has actually declined slightly over the past 10 years. In 1979, when wildlife personnel began keeping the nonhunter-harvested deer death records, 473 deer were killed by motor vehicles.

The report also showed that more deer were killed by vehicles in the northern mountain counties than any other area of the state. In all 11-county areas including Iredell, Alexander, Davie, Forsyth and north to the state line, cars killed 112 deer with 55 of the deaths occurring in Alleghany County alone. The western mountain counties had the lowest number of road kills.

"This is one of the fastest growing states and the more people you have, the more automobile-animal conflicts occur," said Grady Barnes of the Wildlife Management Division.

Biologists suspect that hundreds of depredation kills go unreported. "Landowners may legally kill deer that are in the act of eating crops or destroying their property," Barnes said. "There are probably many more deer killed for that reason than are ever reported."

The report shows that the number of illegal kills has dropped from 142 in 1979 to 91 in 1987-88. No deaths were recorded due to disease in 1987-88.

"It's really hard to tell when an animal dies of disease," said Barnes. "Very often, a scavenger or predator gets the deer before the remains are located." At times, an outbreak of a particular disease is easily identified by biologists. In 1981-82, for example, 488 deer died in North Carolina from hemorrhagic disease.

— Angela Dorman Hill

Cast Us A Line...

If you'd like to share any unusual stories about wildlife or comment on the magazine or conservation issues, let's hear from you. Letters should be 150 words or less. We reserve the right to edit any correspondence. Please send to Letters Dept., *Wildlife In North Carolina*, 512 N. Salisbury St., Raleigh, N.C., 27611.

Three Strikes, He's Out

Poacher Learns Expensive Lesson

Some people never learn, as exemplified by a Kinston man arrested three times in three weeks for illegal deer-hunting activities.

This hapless poacher was convicted this year of deer hunting at night and selling deer meat after officers with the N.C. Wildlife Resources Commission arrested the man during an undercover sting operation. With the help of the Greene County Sheriff's Department, undercover officers bought a deer from the man. Several days later, the man was arrested on night deer-hunting charges. Undercover officers later returned to buy another deer. Using search warrants to find the illegally taken game, they charged the man with two counts of selling deer.

In addition to the recent charges, the subject had been convicted of two counts of deer hunting at night in 1988.

Upon conviction, the district court judge took a "three strikes and you're out" attitude to the case. The offender was ordered to pay $2,000 in fines, $279 in deer-replacement costs, $100 in community-service fees, $540 in probation fees, and $120 in court costs. "This shows we are not going to tolerate abuse of our wildlife resource for personal gain," said Col. H. Ragland, the Commission's enforcement chief.

A Triple Play!

Hungry Bass Give Youngster A Show

Dear Editors:

My good friend Mike and his son Brad had joined me for an afternoon at my wife's family farm in Randolph County. Brad was only five years old and was eager to catch a fish, as only a five year old can be. No sooner had we gotten in the boat when Mike and I were both yelling for Brad to set the hook. He had caught his first bass and couldn't have been happier.

After about an hour of catching and releasing bass, I pulled in what I thought was a nice-sized bass only to be surprised by two small bass hooked on one worm (I was using a double-hook weedless purple worm). We had just stopped talking about that when Mike's rod dipped—he pulled in three small bass hooked on one lure (a triple-treble hooked plug). We're still telling this story, and Brad, he's been hooked on fishing ever since.

John Gallman
High Point, N.C.

Field Notes

Season openings or closings this month:

Eastern gun deer season	Closes Jan. 1
Central gun deer season	Closes Jan. 1
Northwestern gun deer season	Closes Dec. 2
Western gun deer season	Closes Dec. 9
Western bear season	See *Regulations Digest*
Wild boar	Dec. 11 to Jan. 1
Gray squirrel	Closes Jan. 31
Fox squirrel (only in 18 counties. See *Regulations Digest*)	Closes Dec. 30
Rabbit	Closes Feb. 28
Bobwhite quail	Closes Feb. 28
Ruffed grouse	Closes Feb. 28
Western raccoon and opossum	Closes Jan. 31
Eastern raccoon and opossum	Closes Feb. 28
Woodcock	Closes Jan. 1
Snipe	Closes Feb. 28
Mourning Doves	Dec. 16 to Jan. 13
Ducks, mergansers and coots	Dec. 14 to Jan. 6
Sea ducks	Closes Jan. 16
Snow and blue geese	Closes Jan. 31
Brant	Dec. 14 to Jan. 20
Swan (by permit only)	Closes Jan 31

Information on bag limits, either-sex hunts and other regulations may be found in the 1989-90 *North Carolina Inland Fishing, Hunting and Trapping Regulations Digest.*

In addition to purchasing the federal duck stamp, North Carolina waterfowl hunters are required to buy a $5 state waterfowl stamp and should note areas where steel shot is now required.

Guide To Photography And Smokies

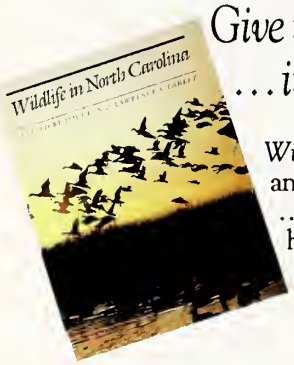
A Guide to Photography and The Smoky Mountains. Photographs by John Netherton, text by David Duhl and John Netherton. Published by the Cumberland Valley Press, 1216 Vintage Place, Nashville, Tennessee, 1988. Paperback, $17.95

For the photographer who is interested in producing more than just another slide of fall foliage, John Netherton and David Duhl have produced a helpful guide. Like others of its kind—notably John Shaw's excellent books on nature and close-up photography—the book features such beautiful images of wildflowers and waterfalls, salamanders and sunrises that it will no doubt stampede a horde of eager photographers to the mountains.

Netherton and Duhl, the photographer and author respectively, have given the reader not only a primer in nature photography, but also a travel guide to some of the most photogenic locations in the Smokies. For the less adventuresome, there's even instruction on where to stand for best results. The book is full of useful information on the subtleties of film choice, the use of mirrors to provide light on close-ups, and what to do to correct the blue cast in color film shot on a cloudy day. Captions to the 90-plus color photos describe the lens used, shutter speed and f-stop.

Which is to say that it's a book that will appeal to professional and amateur photographers alike.

—*Lawrence S. Earley*



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To order your subscription and print, see page 33.

Winter Fairyland

What is it about a coating of mere ice that creates a world so strange and wondrous? Is it the certainty that our time among these fragile, white monuments will be so fleeting?

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